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CLARENCE GOODE,

*Minister of Agriculture.*

## POINTS FOR PRODUCERS.

### **Agricultural Bureau Conference.**

Arrangements are now being made for the third annual Conference of Branches of the Agricultural Bureau situated on the River Murray. The gathering will be held this year at Waikerie, and the time fixed on is the third week in May.

### **Farmers and the Soldiers' Funds.**

Unanimous support was given by the representatives of 145 Branches of the Agricultural Bureau to the 1916 Congress resolution that every Agricultural Bureau member should set aside a definite acreage of the then coming harvest, the proceeds to be devoted to the South Australian Soldiers' Fund.

Donations are now coming to hand, and if the resolution receives the practical support which the nature of its reception at the Congress augured, the resources of the Wounded Soldiers' Fund should be materially augmented.

### **The Breeding Sow.**

The symptoms of heat in the sow are—There is redness and swelling behind, and the animal rides the others. She remains on heat for three days, and at first a slimy discharge may be noticed. If she does not hold to service she will come on in 21 days again, the three weeks being the period between heats. A sow that has farrowed comes on a week after weaning, as a rule. Boars should not run with sows, but be kept separate to avoid accidents and exhaustion from too frequent matings. One complete service is most effective. From seven to nine months old is the usual time to begin breeding.—FRAS. EVELYN PLACE.

### **Feed for Chicks.**

The mixture used for the feeding of chickens at the Parafield Poultry Farm by the Poultry Expert (Mr. D. F. Laurie) is made up of two parts wheat, one part hulled oats, one part barley cracked to quarter size. To this is added some granulated charcoal and shillgilt.

In the same proportion, but ground fine, the same cereals are used for dry mash fed in hoppers. To the dry mash an addition of 5 per cent. of meat meal is added.

### **Women and Agriculture.**

The recommendation of the Advisory Board of Agriculture that provision should be made for the inauguration of Women's Branches of the Agricultural Bureau will be read with considerable interest. If given effect to, the scheme should mark a new era in the Agricultural Bureau, and its importance to the womenfolk living in the State agricultural areas should be of no less moment.

The extension of the Agricultural Bureau system in this direction would seem to be a natural development of an institution designed with the object of promoting agricultural education, more especially so at a time when stress of economic conditions has thrown an increased burden of agricultural work on to the women members of the farm household.

## INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—Ed.]

"A. Mc.," Tantanoola, asks for treatment for warts on teats of cows.

Reply—If big enough, snip off with scissors and touch with caustic (silver nitrate). If small, rub one day with vinegar and next with castor oil; keep on till warts disappear.

"C. C.," Tantanoola, asks for information regarding bots.

Reply—The bot fly has no sting, therefore cannot sting. Horses are frightened because they recognise a troublesome visitor. Kerosene and castor oil smeared on skin will keep them off.

"A. J. W.," Carrawilla, has a cow which is blind at night.

Reply—There is little doubt but that the yacca is at the bottom of the mischief. Give her a tablespoon of the following powder night and morning in feed, and report progress in a month—½ lb. each sulphate of iron, sulphur, nux vomica, gentian, ½ lb. each sugar and linseed meal.

"C. M.," Uraidla, has a cow with hard lumps on one side of the udder and loss of milk.

Reply—It would appear as if there had been a cold caught on the affected side, and it would be a good plan to give morning and evening for a week 20 drops tr. phytolacca, also to well foment the affected quarters twice daily with hot soap-suds containing a few drops of the same tr.

"G. F. B.," Hammond, has bay mare, 5 years, rapidly falling off in condition, lampas unusually prominent, very small mouth, appetite very poor; formerly over-gorged with wheat, and hoof sloughing off.

Reply—The animal certainly will not pay for treatment; the main trouble is with the teeth, owing to the narrowness of the mouth; the appearance of lampas is due to the same cause. A new, but defective, hoof will grow in the course of months. Instead of drugging, turn her out for 12 months in good feed, with access to a creek; she may come up useful after, but it is doubtful.

"L. W. H.," (no address given) has cow with perforation of tent.

Reply—Touch with red-hot wire. Cover with adhesive plaster and collodion. See former *Journals*.

"J. G.," Springbank, via Port Pirie, has a draught gelding, 9 years, badly cut on fetlock by barbed wire.

Reply—As the wound has nearly healed it will be well to let it do so, and a month later to blister with ½ oz. of blister made of 1 dram biniodide of mercury and 7 drams lard. But there is every probability that the bone has been injured, and that the swelling will remain. If a month after blistering there is a lessening of the swelling, then write again, and perhaps something more may be done.

"H. G. L.," Mypolonga, has a yearling filly in good condition which has broken out on belly with hard lumps.

Reply—There are two possibilities—(1) That it is a case of nettlerash or hives, which a dessertspoon of sulphur in feed twice daily for a week will cure; (2) worm tumors caused by flies. If the former treatment does not succeed, this will be the case, and may yield to a dessertspoon of Fowler's solution of arsenic in feed twice a day for a week.

"A. J. P.," Hectorville, has a mare, 8 years, which, after foaling, swelled under belly and breast.

Reply—The swellings were probably caused by parasites, and it is probable that under treatment she will improve. Give a tablespoon of Fowler's solution of arsenic in feed twice a day for three weeks. If she is paddocked she will probably come in for a handful or two of bran, in which the medicine may be mixed. Bathing the swellings with cold water and vinegar in equal proportions may also assist. Kindly report progress at end of three weeks.

"C. M. W.," Netherton, has a mare, 3½ years, which, in good condition, went to siding with load of wheat, fed on soaked wheat and cocky chaff, fed between 11 and 12 at night. Found missing in morning; when discovered was blown up like football; driven a mile and a half to yard, and given bicarbonate of soda; died in a few minutes.

Reply—The condition was flatulent distension of the stomach, caused possibly by eating ravenously when tired; the treatment some hours earlier would have done good, but probably the heart's action was interfered with when she was found. It is better to give a bucket of water and a handful of pollard in it and then a little long hay after a long day's work.

"G. L. H.," Koonunga, had pigs which died after castration.

Reply—As suspected, bloodpoisoning was the cause of the symptoms and deaths; although the pig is very tolerant of dirt, still care must be taken to use a clean knife, and a dressing of kerosine or virgicris ointment after operation is desirable. Should such an accident happen again, reopen the wounds and syringe out with a solution of 1oz. boric acid and 1oz. chlorinated lime to 1 quart water. It would be better to bury pigs dying in this way, but if well boiled they probably would not hurt fowls.

#### HORTICULTURAL INQUIRIES.

Replies supplied by the Horticultural Instructor (Mr. GEO. QUINN).

##### ELEPHANT BEETLES.

The Berri Branch of the Agricultural Bureau forwarded specimens of beetles found on plum trees, which they had denuded of a number of young shoots. The beetles are not the same as those called curculio, although they belong to the same family. Those sent are known as elephant beetles (*Orthorhinus cylindricus*). They puncture the shoots or limbs and deposit an egg in each minute tunnel. The resulting grubs burrow the limbs and pupate in the tunnels. The perfect beetles emerge from the enlarged tunnels in spring and summer to repeat the cycle of egg-laying, &c. As they are natives, and live in all sorts of growing wood, everything in the shape of prunings should be removed and promptly burnt. Tamarisk trees are favorite hosts for this pest. Plantations, or parts of them affected, should be sprayed with lead arsenate, say 1lb. in 10galls, to 15galls, or dusted with paris green and quicklime, 1oz. to the pound, in the spring or early summer.

##### A BORING INSECT.

"G. F. G.," East Adelaide.—From the description given of the boring insect attacking your apricot trees I am inclined to consider it is identical with the common stone fruit tree boring caterpillar found on the plains of Adelaide. These caterpillars arise from the eggs laid by a moth known as *Maropa gigantilla*. The presence of the borer is first indicated by patches of sawdust-like borings adhering to the limbs, frequently in the forks or on spots where gum exudes. When these are scraped away whilst still fresh, the small caterpillars are found beneath, not having penetrated the hard fibre of the wood; but later on, if not molested, they tunnel into the heartwood. The best means of prevention known consists of carefully attending, at each winter pruning, to any sawdust indications, and destroying the caterpillars before they penetrate deeply. Should they have burrowed out

of sight, a thin wire thrust into the hole will often destroy them. If not vulnerable in this way, the caterpillar can be suffocated by using a little bisulphide of carbon liquid, saturating a piece of cotton wool or wadding the size of a pea with it, and inserting this wad into the hole, which is plugged immediately airtight with clay. The fumes fill the tunnel, and suffocate the pest. This chemical is very inflammable, and must not be used near a naked light, match, &c.; it must also be kept tightly corked. It costs about 1s. per lb. from wholesale druggists.

#### AGRICULTURAL INQUIRY.

Reply supplied by the Superintendent of Experiments (Mr. W. J. SPAFFORD).

"H. B. W., Victor Harbor.—(1) If by artificial manure, superphosphate is meant, there is no danger of it being washed out of reach of the roots of the ordinary annual crops. There are many constituents in the soil that very readily combine with phosphoric acid, making substances not soluble in water, and so phosphoric acid does not move once it is put in the soil, but both nitrogen and lime are washed out of it very quickly. (2) It is generally recognised that, where the water-table is not too near the surface, the main roots of the wheat plants penetrate from 4ft. to 5ft., but they have been found to reach 7ft. from the surface.

#### MANGOLDS AS PIG FEED.

Upon many points regarding mangolds and pigs, breeders differ, but they are all agreed upon the following:—(1) Mangolds are very injurious to in-pig sows, often causing them to slip. (2) Fresh mangolds fed to pigs cause acute indigestion, which is not the case when they are stored. (3) The feeding value of mangolds is very small from a fatterer's point of view. (4) Boiled with other feed they are more satisfactory. (5) As they are tasty, pigs will over-eat when they have the chance, with acute indigestion resulting. (6) Like all succulent feed, fed in moderation they are good; in excess, harmful. (7) The cause of death on account of pigs eating them uncooked is in most cases acute indigestion. (8) Treatment would be baking soda and ginger, a teaspoon or so of each. —FRAS. EVELYN PLACE, BV.Sc. M.R.C.V.S.

## EYRE'S PENINSULA.

### ITS AGRICULTURAL DEVELOPMENT AND THE WORK OF THE DEPARTMENT OF AGRICULTURE.

At the recent Conference of Upper Eyre's Peninsula Branches of the Agricultural Bureau, held at Cowell on February 27th, the Director of Agriculture (Professor Arthur J. Perkins) instead of delivering a set address, as is usual on such occasions, dealt with the work on Eyre's Peninsula of the Department of Agriculture, both from the point of view of what had been done, and the policy of the Department in relation to the West Coast.

Professor Perkins said—Eyre's Peninsula generally is apt to look upon itself as isolated, and not in touch with the Department of Agriculture. Whilst its geographical position does separate it to a certain extent from the Department, I hope you will admit we are going through rather difficult times in many ways. The war has given rise to a good deal of new work which the Department has to undertake, and which prevents us from doing as much as we would like to do in outlying districts of the State. But we have made a start in various directions, in so far as this area of country is concerned, and I hope that gradually we shall learn more about the country and be in a position to help more than we have been able to in the past.

I am inclined to look upon Eyre's Peninsula as a newly-settled part of the State, and although portion of the country has been settled for many years, I still feel that mere length of years does not necessarily imply definite settlement in so far as the land is concerned. The country may have been occupied, but from what I have been able to see it can hardly be called settled country. I have a very vivid recollection of being shown a farm which I was told had been settled for 30 years on the fallows of which the mallee shoots were still growing. I am afraid that it cannot be seriously disputed that you are really in the early settlement stages, in so far as the great bulk of the country is concerned, and unquestionably, the sooner you are able to get out of this position the better for yourselves and the State as a whole.

#### THE EYRE'S PENINSULA FARM.

You will recollect that three years ago the Government asked me to pick out some central area on Eyre's Peninsula that could be used as a Government farm. You will also recollect that there was hardly a farm-

dred in the Peninsula that did not want the farm. In making the selection of the site I took four points to guide me. The first was, considering the extent of the Peninsula, we needed a central position, accessible to the general public by being close to a port or railway station. Secondly, whatever might be thought to the contrary, I felt that it should not be placed in a locality which would not prove a good advertisement for the Peninsula. It would have been a serious mistake to have established the farm in a locality in which results would have been uniformly unsatisfactory. A Government farm is visited by far more people than an individual farm, and if, for example we had placed it in a locality in which results were unsatisfactory, the outside public might have inferred that the balance of the Peninsula was no better. We required a good piece of land for that particular reason. I want to feel that I can take people on this farm and show them what can be done on certain parts of Eyre's Peninsula. Thirdly, I looked for an adequate water supply, and fourthly a sufficiency of fencing material. These were the different points that guided me, and I finally fixed on Minnipa.

I should like very much that the people of Eyre's Peninsula should look on the Minnipa Farm as their particular farm, however differently they may happen to be situated. Of course it does not follow that other farms will not be established in the future; indeed, I hope that in the course of time we shall be able to do far more for you than has hitherto been the case.

#### FARMERS' PLOTS.

Whilst in present circumstances I cannot very well hold out the hope that an experimental farm may be started in this neighborhood, there is something that can be done which will involve the State in far less expenditure, and at the same time meet some of your difficulties. In the hundred of Butler last year we started farm plots on farmers' land, and possibly something similar might be done here.

There is no reason, excepting the size of the Departmental staff, that something of the sort should not be done in this district. It is worse than wasting money, however, to attempt to set out plots which cannot be efficiently supervised. The work involves a staff of a certain size, and we cannot undertake to take up a large number of additional plots in a single year.

#### MINNIPA FARM.

Some of the results that we have secured on the Minnipa Farm in 1915-16-17 are given in the accompanying tables. You will see that in the first year of the handling of this farm the whole of the crop sown, 118 acres, was cut for hay. This point brings up a matter which to me seems of importance, that is, the complete clearing of the land.

What I want you to realise is that in this our first year, we were able to put the binder on the total area that had been cleared.

In many parts of the Peninsula roots and stumps, it is said, are not detrimental to cropping; they are even claimed as an advantage. Personally, however, I have always held that the only reason we cultivate land in the way we do in the mallee is lack of capital. If a settler has the necessary capital I feel confident that it will pay him better to clear the land thoroughly from the outset, and I am endeavoring to demonstrate that that is so. I even hope that in a not very distant time we shall be able to do without the stump-jump implements. Later on I shall be able to submit definite data as to the cost of clearing on the Eyre's Peninsula Farm.

The country at Minnipa is not country that can be rolled in the ordinary way. The mallee is exceedingly large, and some of the neighbors who were putting crops there have simply chopped the trees to a height of about 2ft., and were growing crops around them. Probably these men have not the means of doing anything else.

#### TAKEALL.

The question of takeall has been raised. Something like 25 years ago this question was a very live one throughout Yorke Peninsula, which was then in comparatively early stages of settlement. Similarly as soon as the settlement of the Murray mallee and the Pinnaroo district began, we had the same question cropping up, and again in Eyre's Peninsula on the lighter mallee lands. It appears to me that takeall is the unavoidable consequence of our usual methods of reclaiming the mallee. Where the land is rolled, cropped, burned, cropped again, burned, cropped again, and so on, in the end you get a condition of things which appear to be favorable to the development of takeall. I feel certain, however, that as you emerge from the pioneering stage this disease will gradually disappear in the same way as it has practically disappeared on Yorke Peninsula. I have worked for years on mallee country, and to my knowledge we have never had any trouble with takeall on any extensive scale. On the other hand, we have to face this fact, that farmers are accustomed to call "takeall" anything affecting their wheat crop for which they cannot account. This leads to a good deal of confusion. There is one type of takeall, however, that is very distinct. This is a fungus disease which grows up on the wheat plant, attacks the roots, and appears just about the bottom internode where the straw joins on to the root system. This may form a bare patch which extends from week to week if conditions are favorable, forming in the end a more or less circular patch. This dying-back of the wheat plants may continue up to harvest time, ending in white heads on the edge of the crop. One particular condition that appears



to favor the disease is a certain openness and looseness of the soil that you get when you endeavor to grow crops year after year, so that it would seem that takeall is far more prevalent among crops sown successively in newly-reclaimed land than in cases where the land is fallowed, and worked down properly. There are times when you cannot do justice to your fallows, with the result that takeall develops. Light land should never be ploughed dry, and should certainly be broken up as early as possible in the winter months; the more rain that falls on it the less is the danger of disease.

#### OATS.

The question of oats as a remedy against takeall has been suggested, and without a doubt oats are useful, since they are more or less immune to the disease, and represent variety in cropping. The question of the liability of oats to takeall is apparently a debatable one; but, in any case, it is only slight. If a crop badly affected with takeall were followed with a crop of oats, followed by a year's grazing, it would do much towards clearing the land of takeall: it is essential, however, in the years that follow, that the land be maintained clean and free from seeds harboring the takeall fungus.

#### EYRE'S PENINSULA FARM.

In regard to the present season at Eyre's Peninsula, you will notice from the accompanying table that the rainfall has been very satisfactory: of the 18in. that fell 16½ were spread over the period extending from April to November. The area cropped was nearly 223 acres, consisting of new land fallowed in the previous year, 38.752 acres; new land, burnt in the autumn, 36.089 acres; and stubble crop land 148 acres. The newly cleaned land was represented therefore by about 75 acres. The wheat on fallow, stubble, and new land, yielded about 2½ bush. This is a satisfactory result. The hay went approximately four tons. Like every other portion of the State, we had a great deal of harvesting difficulties, and in one field we lost about two bags to the acre.

#### EYRE'S PENINSULA EXPERIMENTAL FARM.—1915-16.

|  |          |
|--|----------|
| Total 1915 rainfall . . . . .  | 13.88in. |
| April-November rainfall . . . . .  | 12.59in. |
| New land completely cleared, burnt and ploughed, February to April, 1915, 148 acres. |          |

|                         | Sec. diam. |                  | Date sown. |
|-------------------------|------------|------------------|------------|
|                         | Acres.     | Super. per acre. |            |
| Algerian Oats . . . . . | 48         | 113lbs.          | May 5-8    |
| Silver King . . . . .   | 37         | 90lbs.           | May 19-22  |
| King's Red . . . . .    | 35         | 96lbs.           | June 15-17 |
| Gloyas . . . . .        | 14         | 120lbs.          | June 18-19 |
| Eclipse . . . . .       | 14         | 120lbs.          | June 19-21 |

*Harvest Results.*

In view of probable chaff requirements of new settlers the whole of the crop was cut for hay, and averaged 1 ton 17cwt. 94lb. per acre.

## EYRE'S PENINSULA EXPERIMENTAL FARM.—1916-17.

|                                   |          |
|-----------------------------------|----------|
| Total 1916 rainfall . . . . .     | 18.02in. |
| April-November rainfall . . . . . | 16.62in. |

*Land Cropped.*

|                                    |                     |
|------------------------------------|---------------------|
| New land fallowed . . . . .        | 38.752 acres        |
| New land burnt in autumn . . . . . | 36.089 acres        |
| Stubble crop . . . . .             | 148.000 acres       |
|                                    | <hr/> 222.841 acres |

|   |                     |                         |
|---|---------------------|-------------------------|
| Oats (stubble and new land) . . . . .           | 49.902 acres        | 39bush. 33lbs. per acre |
| Wheat (fallow, stubble, and new land) . . . . . | 171.726 acres       | 28bush. 35lbs. per acre |
| Hay . . . . .                                   | 1.213 acres         | 4 tons approximately    |
|   | <hr/> 222.841 acres |                         |

## EYRE'S PENINSULA EXPERIMENTAL FARM.—1916-17.

*Wheat Fields.*

| Variety.                  | Area.<br>Acres. | Condition of Land.        | Yield per acre. |      |
|---------------------------|-----------------|---------------------------|-----------------|------|
|                           |                 |                           | Bush.           | lbs. |
| Caliph . . . . .          | 11.869          | New land fallowed in 1915 | 35              | 50   |
| King's Red . . . . .      | 14.125          | " " "                     | 35              | 4    |
| Queen Fan . . . . .       | 3.338           | " " "                     | 34              | 31   |
| College Eclipse . . . . . | 9.420           | " " "                     | 33              | 17   |
| Means . . . . .           | 38.752          | " " "                     | 34              | 32   |
| Eclipse . . . . .         | 35.781          | 1915 stubbles             | 29              | 37   |
| King's Red . . . . .      | 20.530          | " "                       | 28              | 25   |
| College Eclipse . . . . . | 0.750           | " "                       | 28              | 11   |
| Baroota Wonder . . . . .  | 37.980          | " "                       | 27              | 56   |
| Queen Fan . . . . .       | 0.285           | " "                       | 26              | 1    |
| Gluyas . . . . .          | 12.371          | " "                       | 17              | 57   |
| Means . . . . .           | 107.697         | " "                       | 27              | 17   |
| Gloyas . . . . .          | 25.277          | New land burnt in autumn  | 24              | 41   |

With the exception of Gluyas on new land, which was divided into manure plots, all the varieties were dressed with 1cwt. of super. to the acre.

## EYRE'S PENINSULA EXPERIMENTAL FARM.—1916-17.

*Manure Plots.*

New land cleared and burnt in autumn of 1916, ploughed up and sown to Gluyas wheat.

| Manure Dressing.                  | Area.       | Yield per acre. |      |
|-----------------------------------|-------------|-----------------|------|
|                                   |             | Bush.           | lbs. |
| 2cwt. super. . . . .              | 4.418 acres | 28              | 35   |
| 1cwt. super. . . . .              | 4.046 acres | 24              | 11   |
| $\frac{1}{2}$ cwt. super. . . . . | 3.539 acres | 22              | 55   |
| No manure . . . . .               | 3.598 acres | 19              | 56   |
| Headlands.                        |             |                 |      |
| 1cwt. super. . . . .              | 9.676 acres | 25              | 33   |

This crop was very badly lodged, and, in the manager's estimate, fully two bags to the acre were lost, particularly in the heavily-manured plots.

I should like to say about this farm that we shall have a fair area under crop in the coming season, and I shall be able to leave a fair area of the cleared land out for fallowing. I propose establishing an orchard, and endeavoring to make the surroundings attractive to visitors. We shall have good typical livestock, and I hope that we shall see there as often as possible, farmers who have the opportunity of moving about. I shall endeavor to persuade the Government to give special inducements to them in the way of occasional free passes on the trains. It is my ambition to see there a Conference of the Eyre's Peninsula Branches of the Agricultural Bureau

#### FARMERS' PLOTS ON EYRE'S PENINSULA.

During the present season we have restricted ourselves to tests of varieties of wheat on one farm, and to manurial tests on the other. In both cases the crops were badly affected with takeall. On Mr. Butler's farm we had six varieties of wheat, all dressed with 1cwt. of super. to the acre, the plots in each case being three acres in area.

On Mr. Jericho's farm the results were better, although there was also trouble with takeall. You should notice that the heavy dressings of super. did not blight the crop on the light land, as it is frequently alleged they do.

#### FARM PLOTS IN HUNDRED OF BUTLER, 1916-17.

##### *Varieties of Wheat (Mr. S. L. Butler's Farm).*

| Variety.                | Yield per Acre. |
|-------------------------|-----------------|
| Yandilla King . . . . . | 15bush. 23lbs.  |
| Gluyas . . . . .        | 12bush. 11lb.   |
| King's Red . . . . .    | 10bush. 19lbs.  |
| Queen Fan . . . . .     | 8bush. 14lbs.   |
| Firbank . . . . .       | 5bush. 34lbs.   |
| Marquis . . . . .       | 4bush. 24lbs.   |

Three-acre plots, dressed with 1cwt. super. per acre; all badly affected with takeall.

##### *Manure Plots (Mr. C. F. Jericho's Farm).*

| Manure.      | Variety.         | Yield per Acre. |
|--------------|------------------|-----------------|
| 3cwt. super. | Gluyas . . . . . | 28bush. 31lbs.  |
| 2cwt. super. | Gluyas . . . . . | 23bush. 32lbs.  |
| 1cwt. super. | Gluyas . . . . . | 16bush. 32lbs.  |
| ½cwt. super. | Gluyas . . . . . | 16bush. 17lbs.  |
| No manure    | Gluyas . . . . . | 12bush. 12lbs.  |

All plots 2 acres in area, excepting No Manure, which was one acre. Slightly affected with takeall.

1916 rainfall for the locality. 15.6in.

It might be of interest to you to see results from land in the mallee where the conditions are somewhat similar.

## WILKAWATT FARM PLOTS.

(Mr. W. J. Tylor's Farm.)

Manure Plots, 1916-17.

| Plot. | Manuring per acre.  | Yield per acre. |
|-------|---|-----------------|
| 1.    | ½wt. super. . . . .   | 12bush. 49lbs.  |
| 2.    | 1wt. super. . . . .   | 13bush. 42lbs.  |
| 3.    | 2ewts. super. . . . .   | 19bush. 39lbs.  |
| 4.    | 1wt. basic slag . . . . .   | 12bush. 32lbs.  |
| 5.    | No manure . . . . .   | 12bush. 6lbs.   |
| 6.    | 2ewts. basic slag . . . . .   | 18bush. 56lbs.  |
| 7.    | 2ewts. super., ½wt. nitrate of soda (spring) . . . . .                            | 22bush. 17lbs.  |
| 8.    | 2ewts. super., ½wt. sulph. of potash (seedling) . . . . .                         | 21bush. 7lbs.   |
| 9.    | 2ewts. super., ½wt. nitrate of soda, ½wt. sulph. of potash, 5ewts. lime . . . . . | 21bush. 18lbs.  |
| 10.   | 5ewts. lime . . . . .   | 14bush. 49lbs.  |
| 11.   | 5ewts. lime, 2ewts. super. . . . .  | 18bush. 37lbs.  |

One bushel of Baroota Wonder wheat was drilled in to the acre on all of the plots.

## Averages for 1915 and 1916.

| Plot. | Manure per acre.            | Yields per Acre.   |                    | Means.<br>1915-1916. |
|-------|-----------------------------|--------------------|--------------------|----------------------|
|       |                             | 1915.<br>Bus. lbs. | 1916.<br>Bus. lbs. |                      |
| 1.    | ½wt. super. . . . .         | 9 16               | 12 49              | 11 2                 |
| 2.    | 1wt. super. . . . .         | 15 17              | 13 42              | 14 20                |
| 3.    | 2ewts. super. . . . .       | 21 8               | 19 39              | 20 23                |
| 4.    | 1wt. basic slag . . . . .   | 11 38              | 12 32              | 12 3                 |
| 5.    | No manure . . . . .         | 8 43               | 12 6               | 10 24                |
| 6.    | 2ewts. basic slag . . . . . | 13 37              | 18 56              | 16 16                |

## Averages for 1914, 1915, and 1916.

| Plot. | Manure per acre.    | Yields per acre.   |                    |                    | Means.<br>1914-1916. |
|-------|---------------------|--------------------|--------------------|--------------------|----------------------|
|       |                     | 1914.<br>Bus. lbs. | 1915.<br>Bus. lbs. | 1916.<br>Bus. lbs. |                      |
| 5.    | No manure . . . . . | 1 11               | 8 43               | 12 6               | 7 20                 |
| 1.    | ½wt. super. . . . . | 3 34               | 9 16               | 12 49              | 8 33                 |
| 2.    | 1wt. super. . . . . | 3 56               | 15 17              | 13 42              | 10 55                |

From the point of view of the dressing of super., I think that if we can have plots in different portions of the State, and if we can show that in certain districts heavy dressings pay better than light ones, no doubt the farmers will in time make use of them. If you clear the land thoroughly, fence it, provide water, and if you can see your way to use heavier dressings of super. the carrying capacity of the land will be so improved that you will be surprised at the quantity of livestock that you can carry. At Roseworthy, when I took charge, in spite of the fact that I did not handfeed very heavily, and that there was very little land out for ordinary grazing, I was able to keep about one sheep to the acre. You may not be able to carry one sheep to the acre on the farms here, but you could easily carry one sheep to the acre on the grazing area, if you farmed the land well. When I say that, I include such grazing crops as you can grow—I am not relying merely on the weed growth of ordinary farm pasture. It is necessary to distinguish between the farm and the station in this direction.

## AGRICULTURAL BUREAU.

### Conference of Lower North Branches—Held at Lyndoch.

The annual Conference of the Lower North Branches of the Agricultural Bureau was held in the Institute, at Lyndoch, on Friday, March 2nd. There was a very large attendance of delegates, and Mr. F. Moore, Chairman of the Lyndoch Branch, presided. Assembled on the platform were Mr. F. Coleman (Chairman of the Advisory Board), Mr. W. J. Colebatch (Principal of the Roseworthy Agricultural College), Mr. F. E. Place (Government Veterinary Expert), Mr. D. F. Laurie (Poultry Expert), Mr. H. E. Laffer (Viticultural Instructor), Sir Richard Butler, M.P., Mr. Hague, M.P., and Mr. H. J. Finnis (Acting Secretary to the Advisory Board).

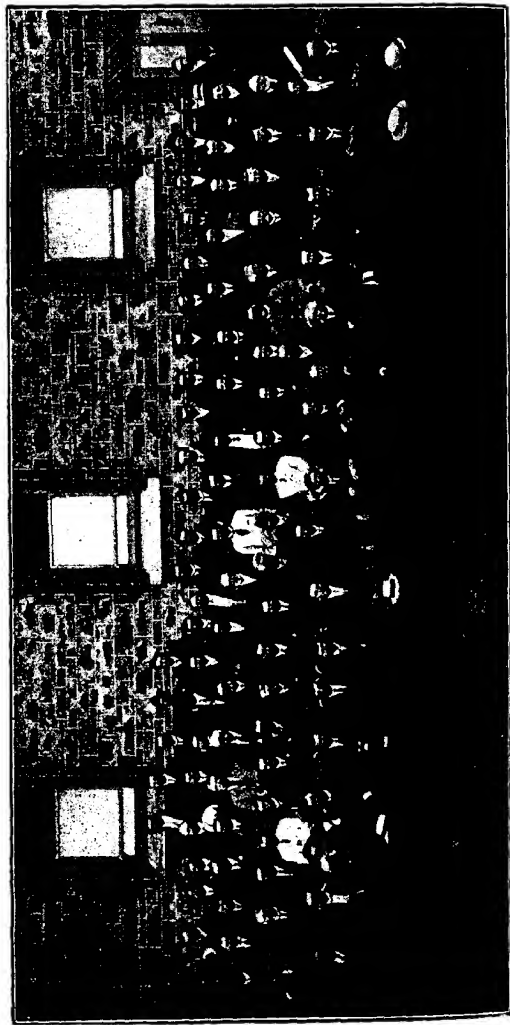
### EXHIBITION OF PRODUCTS.

Arranged around the hall was a very fine collection of the products of the district, comprising specimens of wheat, maize, sorghum, millet, fruit, vegetables, flowers, wool, wine, honey, butter, cheese, &c.

### OPENING CEREMONY.

The National Anthem having been sung, the President called upon Mr. Coleman to open the Conference.

Mr. Coleman said that it was usual, where possible, for the Minister of Agriculture to open the Conference, but Mr. Goode had been called away to Melbourne unexpectedly, and it was not until that morning, when he arrived at Gawler, that he (Mr. Coleman) had been asked to open the Conference, and therefore they should not expect an elaborate speech from him. He was pleased to see the magnificent exhibits in the hall. During the past three years he had been to different parts of the State to attend conferences, but in no place had the splendid display which he then looked upon been surpassed. It was recognised that that was one of the finest districts in the State, and that in the Barossa Hills they had a fine inheritance which was capable of producing in the future far more than in the past. In the past season the grape crop had been very poor, and therefore the display that day was the more creditable to those who had undertaken the arrangement of it, and he congratulated the Branches concerned. The Agricultural Bureau was a live body, and was still growing. They had 190 Branches, with a membership of more than 5,000, and amongst them were some of the most live producers in the State in the different departments of rural production. That district could hold its own with any other district, not only in that State, but in the Commonwealth, and during the next few years they must produce all they possibly could. The British Government was promising 4s. 6d., 5s. 9d., and 6s. 6d. per bushel to encourage production there, so that all would be assured of good returns for their crops for some years to come. For wool the demand would be very great for the next few years, and altogether in a district like that, unlimited in its possibilities, they should produce everything they possibly could in the way of fruit, vegetables,



Some of the Delegates and Officers of the Department of Agriculture who attended the Conference of Lower Northern Branches of the Agricultural Bureau, at Lyndoch.

wine, currants, &c. More could be done than had been done, and he urged them all to take the matter up energetically. During last year eight Agricultural Conferences had been held under the auspices of the Agricultural Bureau in different districts throughout the State, and were well attended, particularly in that district. They had, in that institution, one which had tremendous possibilities. Farmers were not a class who wished to keep their methods secret to themselves, but were willing to give the value of their knowledge and experience to others. Through the Bureau they had the opportunity of discussing their experiences in the cultivation of the soil and the management and control of stock. He hoped therefore that the advantages of the Bureau would be even more availed of than in the past. Rosenthal was one of the most active Branches in that district, and they had made a very great show in the exhibits, particularly in wheat, through the influence of Mr. Stevens. He (Mr. Coleman) was a good deal interested in new varieties of wheat for the district. What suited them in Lyndoch and in the Barossa Hills might not be a variety which would suit other districts. He therefore would encourage the sons of members of the Bureau to take an interest in securing varieties of wheat to suit the district. They should gather the best heads of wheat they could get in the crop and experiment with them, because they would be of the greatest value to the district. Some varieties proved more suitable to some districts than to others, and by experimenting in the way he had indicated they would secure eventually a variety which would give a yield that no other variety could compare with. They knew that certain cows were more suitable to one district than another, according to the supply of feed, and it was the same with wheats. He hoped the Congress which they were opening that day for the first time in that part of the district would be the means of teaching them all something, and they should all resolve to do all they could for the best interests of the State. He had much pleasure in declaring the Conference open. (Applause.)

Mr. H. E. Laffer (Viticultural Instructor) then read a paper on the fungoid diseases of the vine.

(The Conference adjourned for lunch.)

#### BLOAT IN COWS.

On the resumption of the proceedings after lunch Mr. F. E. Place (Veterinary Lecturer) delivered an address on bloat in cows. Bloat was caused, he said, by the accumulation of gas in the paunch, and the question was how to remove it. The simplest method was to smear tar on the animal's nose or tongue. The cow would then proceed to lick it off, and that created a comparatively large amount of saliva, which descended into the paunch, and, acting upon the gas, gave it a chance of being eructated. Another method was to dip a bit of thick rope in tar and put it in the animal's mouth, fastening the other end around her horns. It should be left there a few minutes, and relief would probably follow. A stick, a couple of inches in diameter, with or without tar upon it, placed across the mouth, would be effectual. The gas could also be removed by passing a probang, a more or less elastic instrument, 8ft. or 10ft. in length, with a knob at one end and a

brass tube at the other. The centre was hollow, and there were ap-  
pliances for passing purposes. To use the probang it was necessary to  
confine the cow in the bail, hold her head straight out, and then put  
the probang so far into her mouth that she could not jump it out. The  
probang would then be passed into the paunch and the gas would escape.  
In the absence of a probang the handle of a cart whip, well greased,  
might be used. Great care should be exercised, however, or the gullet  
might be injured, especially if the cow jumped forward just as the  
instrument was passed. A length of 8ft. or 10ft. of indiarubber hose,  
well greased, and applied as a probang should be applied, would prob-  
ably prove successful. In the event of nothing of that sort being avail-  
able opomorphine might be administered, but it was a German drug  
and almost unobtainable at present. Ordinary baking soda, that was  
bicarbonate of soda, or washing soda, 1oz. to 3oz. in hot water, with a  
little milk poured down the cow's throat, would probably give re-  
lief, or even a handful of ordinary salt passed on to the back of the  
cow's tongue would do. If a photo. outfit were handy, 3oz. or 4oz.  
of hypo., dissolved in warm water, given slowly as a drench was also a  
useful remedy. Ammonia of the household sort, a teaspoonful in  
warm water, or a teaspoonful or two of carbonate of ammonia mixed  
in honey or molasses and smeared in the mouth would also give relief.  
Burning feathers or a little sulphur under the cow's nose might seem  
curious, but it was sometimes effective. Other means were the use of  
a trocar and canula. Owing to the formation of the cow's paunch it  
would be found in bloat that there was very much more swelling on  
the left side than on the right, so that if the highest point of the swel-  
ling were taken when the cow was in a standing position—and it was  
practically the same when lying down—standing well up to the shoulder  
the point of the swelling might be pierced with the trocar and canula.  
The trocar should then be withdrawn, and the canula left in. The gas  
would then escape. If no trocar could be obtained almost any knife  
might be used as long as it was sharp. It was better to leave the knife  
in after making the opening, giving it half a turn to give the gas an  
opportunity to escape and to prevent food being forced by the gas as  
the swelling fell away, beneath the skin, and so cause the formation  
of abscesses.

#### DAIRYING.

Mr. R. E. Clements (Gawler) read a paper on dairying as follows:—  
The man who is establishing a dairy, either for the purpose of milk  
producing or cream producing, has four things to consider—(1) The  
best kind of cows to be kept for the line of business he intends to fol-  
low; (2) how to feed to procure the best flow and quality of milk; (3)  
regularity of milking; (4) cleanliness. In regard to the best breed of  
cows to be kept I do not favor any particular pure breed. One man  
favors one breed and another favors another. Some will say that the  
Jersey is the best, another the Ayrshire, another the Shorthorn, and  
another the Holstein, and so on. In my opinion the crossbred cow is  
the most suitable cow in most districts, especially on the plain country.  
Take for instance the pure-bred Jerseys. We find them rich in butter  
fat, but on the whole not large milk producers. The Ayrshire is to  
my mind a better class of cow to be kept, as they are better milk-  
producers and good creamers. The Shorthorn is a good all round



breed, and many of them deep milkers, but they are difficult to breed for good dairy cows, because they often go more to beef than milk, but they cross well with the Jersey or Ayrshire. The Holsteins are always recognised to be the biggest milkers, but not so rich in quality, and they require green feed all the time they are in profit. I favor crossing the Jersey cow with the Holstein bull or the Jersey cow with the Shorthorn bull, and cross the progeny with the Ayrshire bull. I have a great weakness for the Ayrshire, only that they are inclined to be short-teated. Some of the best milkers I ever bred and milked were a cross by an Ayrshire bull. Some people tell us that the Jerseys are the best to keep as they do not cost so much to feed as the bigger cows. If the small cow can give as much milk as a big one it will cost just as much to feed her.

*The Feeding.*—The best feed for a cow is the natural green grass, but we cannot get it all the year round, so we have to get a substitute. The next best is good eaten hay and bran. Every dairyman should procure, say from three-quarters to one ton of bran for every cow he intends to milk during the year. Generally speaking there are only three months of the year we can expect to milk profitably from the green grass. A cow should have from 8lbs. to 15lbs. of bran per day to give good results. Where only 3lbs. or 4lbs. of bran is fed it is only good medicine. At times of the year, namely, the change of seasons, a little molasses or linseed meal will be found to do good.

*Cost of Feeding.*—We will take the first item, bran, say at 1s. per bushel, and using 100bush. for a cow means £5. Hay, 20lbs. per day for six months of the year, or 187 days, will pan out something like £8 per cow, and say 700galls. of milk are produced in the year at 8d. per gallon it will return the dairyman £23 6s. 8d. per cow. The remaining cost is the rental value of your land, say 10s. per acre, and two acres to feed a cow on grass makes the total cost of keep £14, leaving a balance of £9 6s. 8d.

*Cleanliness.*—This is a very important question, and it consists not only in keeping the buckets and milk cans clean. The most important question is to see that the cows' udders are clean before being milked, and that can only be done by thoroughly washing and drying the udders and teats with a cloth before milking to secure a clean supply of milk. Some people take a drop of water in a bucket when they are going to milk a cow and wash the udder. They then begin to milk while the dirty water is dropping from the udder. Washing cows' udders under those conditions does not tend to give a very clean supply of milk.

In reply to a question Mr. Clements said that he found crushed oats better for producing cream than bran. He would give 5lbs. or 6lbs. per day. He would not allow the calf to run with the cow for more than 24 hours after calving. He had 19 cows now. He had 13 the first three months, one came in in March, two in May, two in August, and one in September. From those 19 cows he had drawn 14,743galls. of milk, which made an average of 786galls. per cow. He found dry feed best, because it was more easily digested, and when cows were given wet feed they did not drink as much as was required to keep up the flow of milk.

## SILOS AND ENSILAGE.

Mr. E. J. F. Crawford (Angaston) read the following paper:—Any fodder crops preserved in a semi-green state by a controlled fermentation will come under the term of ensilage, and almost any farm crop, except roots and cruciferous forage crops might be preserved by this method. A silo is a practically airtight receptacle in which green fodder is stored in a succulent state. If properly gathered and packed in the silo the fodder will remain in the same state for as long a period as required without in any way deteriorating in value; it is known as ensilage or silage. Mr. Rankine, of Strathalbyn, ensiled a crop of wheat which was left in the silo for over 20 years. When opened it was found to be in excellent condition. The usual method of preserving crops for fodder has been to allow the crops to partially dry out in the fields and then store them by means of stacking. To make good hay the main points to aim at are to produce sufficient drying in the crop to prevent fermentation afterwards. There is very little difference in the cutting stages for ensilage and haymaking. Instead of allowing the crop to remain out for drying purposes it is carted at once to the silo and the process of ensilage making begun. Ensilage making is the opposite to haymaking, as the idea is to encourage, for a time at least, fermentation, which action properly preserves the food in its green state. The three principal methods are the pit, stack, and tub silo.

## DIFFERENT METHODS.

The first of these, the pit, has been well tried and met with varying success. This was the first form of silo, and has in late years been much improved. Its advantages over the stack silo is a better preservation of fodder throughout the entire mass, and hence less waste. In fact, in a well-made underground silo there should be, practically speaking, no waste. It is the most convenient form of silo in hill country. A cut is made in the side of a sharp hill, three sides of the silo being practically made of earth, which should be lined with timber or brick, and the fourth side or entrance should be composed of strong planks of timber held in their place by two posts placed deeply in the soil, and the planks placed, according as the pit is filled, one on the other, inside of these posts, the pressure of the ensilage from within keeping them in position. In emptying they may be removed one by one as required. It is an advantage to have these planks tongued and grooved so as to exclude as much air as possible. The advantage of a silo so constructed is that the green stuff could be carted round the hill and tumbled into the silo, and later on, when required to be emptied, the cart could be backed to the entrance and the ensilage forked on to it. Such a silo would have all the advantages of both the overground and pit silo combined. In the pit silo the most essential factor is that the walls must be perfectly plumb, otherwise, as the contents settle down, any unevenness of the walls is liable to allow the admission of air, thus causing decomposition at that place. The stack system is more of a makeshift than anything else, and is good enough for preserving green feed in really good seasons, but as a means for preserving feed for any considerable time cannot be recommended.

### THE TUB SILO.

The tub silo was introduced to Australia from America about 1897, and on account of the ease with which it is both filled and emptied, has now practically superseded all other kinds of silo. It has been considerably improved and cheapened since its introduction, and is now within the reach of every farmer. In Victoria the Government will erect a silo for any farmer and accept payment in instalments. I am informed by the Director of Agriculture that it is probable a similar system will shortly be introduced in South Australia, particulars of which will be fully advertised for the benefit of South Australian farmers. This kind of silo may be built of brick, concrete, steel and wood, or wood; all of these materials having proved most satisfactory. There is no doubt that the brick or concrete ones are the best, but the cost is, to most farmers, prohibitive. Where white ants are found the all-steel is the most satisfactory; it is also proof against fire, and if the farmer is leasing property he has the benefit of being able to remove the silo when necessary. The all wood can be cheaply constructed where sawn timber is procurable, and should be very satisfactory in many parts of this district. In Australia few farmers have persevered sufficiently to master the details of ensilage making. Its value has not been sufficiently demonstrated, and, unless afflicted with drought, we do not seriously attack the problem of this class of food conservation. The recent dry seasons have forced attention, and now we find an inquiring spirit slowly being aroused on this important subject.

### THE TIME TO CUT THE CROP.

The time at which to cut the crop to be manufactured into silage varies according to the varieties used. Maize is ready when the bottom leaves are drying off and the grain is doughy but glazed. Experience has taught that the greatest amount of nutritive material is present when the cobs are all glazed. The same applies to sorghum, amaranth, and millet. Oats, wheat, rye, barley, and such crops should be cut when they are about to turn from the green to the ripening stage. At this time the grain will be fairly full and milky. Practically all thistles, weeds, wild oats, and such plants can be made into ensilage. This class of plant should be cut before the seed makes its appearance, and thus prevent the falling of the seed and consequent fouling of the ground for next season. There is no objection to seed getting into the silo, as seed of any kind that has passed through mild fermentation which goes on in a silo will not germinate. With any very green growth it is always advisable to mix sufficient of a drier material to counteract the excessive moisture, which would otherwise mean a mushy ensilage and more than probably sour. The preservation of green fodder in the silo depends on the fermentation going on in the mass, and this is controlled by the amount of air present in same. Too much air causes the mass to decompose, and the ensilage is ruined.

### SWEET OR SOUR SILAGE.

There are two distinct varieties of ensilage—sweet and sour. The former is of a deep-brown color, and has a palatable odour. It is especially good for fattening stock. The sour has a winy sort of smell, but not in any way offensive. It is used principally for milking

cows, and for that purpose has proved very profitable. The two kinds may be well compared to sweet and dry wines. I was present at the opening of a pit silo in the western district of Victoria some years ago, and the sweet smell of the ensilage reminded me very much of a perfect mixture of tobacco. I have seen excellent results from the sour variety used for milking cows in South Gippsland. If the silo is filled slowly, and the material is well tramped down the air is kept out to a great extent and that arrests the fermentation. The temperature does not rise above 90deg. Fahr., and sour ensilage is produced. On the other hand, with quick filling more air is kept in the silo, which allows of fermentation to a greater extent, the temperature rising to 120deg. or 150deg. Fahr., and resulting in the sweet ensilage. Either too slow or too quick filling is not advisable. When ready to be filled the silo should invariably be painted with a thick wash, made with lime and skim milk. This wash can be put on daily, up to the extent of the proposed filling. The coating of the mixture protects the lining of the silo against the acids in the ensilage. This is an important item, and must not be neglected on any account.

#### FILLING THE SILO.

The crops should not be cut before sufficiently matured, and every effort should be made to have the green material put in the silo on the same day as it is cut. It should be put through a chaffcutter and cut from  $\frac{1}{2}$  in. to 1 in. in length. This allows the material to be thoroughly packed in the silo, and leaves no spaces for air. It also means no waste space. Usually an elevator is employed to carry the cut material from the chaffcutter to the top of the silo. This, however, is at the option of the farmer. The elevator is by far the quickest way, and is recommended. In some cases a blower has been used with success. A chute is necessary at the top of the silo so that the material may be lodged in the centre of the silo, and from there be properly packed and tramped. It also ensures the different ingredients being evenly distributed in all parts of the silo. If dropped from the top without a chute, the heavy portions would fall in the centre and the light round the sides—the silage would not settle evenly, and a loss will probably be the result. Filling should be at the rate of not less than 5ft. and not more than 12ft. daily. A full silo thoroughly tramped and packed will shrink about 3ft. A poorly packed one will often shrink as much as 20ft. Too much stress cannot be laid on the importance of thoroughly tramping the mass as it is packed into the silo. The sides as well as the centre require equal attention. The great aim is to exclude air, and to tread all material down in such a complete way as to press out the entangled air. This is more important as the filling approaches the top of the silo, where greater energy and skill are required to perfect the packing and lessen the chances of waste. It is necessary to wait a few days to allow the column of food to settle down and concentrate. When the shrinkage has stopped the tub is filled to the surface once more and with the usual precautions in relation to treading and packing. This will also fall for a time, and it will be necessary to fill again. On completion of the filling the question of sealing the mass must be considered. The best seal is to cover the contents with a sheet made from tarred bags. On top of the tarred

bags put a foot or so of chaffed straw or other waste material. This must be well set so as to encourage mould growths, which act as an airtight seal. On top of this again a heavy weight of sand or earth must be put to press down the top five or six feet of the silage. The weight of the top portion of the silage will keep the bottom pressed down, but the top requires the extra weight to keep it firm.

#### REMOVING THE ENSILAGE.

When the silo is opened and all weight and waste material removed, the contents must be taken out in layers as required. On no account should holes be dug in the ensilage. The best method is to scrape off sufficient for use, and afterwards cover the remainder with the tarred bags. The less the silage is exposed to the air the better it will keep. Air is the worst enemy of ensilage. A fair daily ration for a dairy cow is 30lbs. when fed with other fodders. Sheep will eat about 3lbs. daily, but it has been found that about 2lbs. will keep a sheep in good condition. Horses should only have very small quantities, otherwise there will be trouble from stomach derangements. A few pounds daily is sufficient. In practice any green fodder that is suitable for animals in its green state is good for ensilage, and does not lose any of its nourishing material. In many cases, such as Scotch thistles, the harder fibres are softened in the process of making ensilage, and are more easily digested. I am informed that one farmer has been gathering the thistles from the road between Gawler and Adelaide for the purpose of making ensilage. Probably these thistles will prove good ensilage, as they will come out of the silo in a softer state and be more acceptable to the animals than at present. One dairy farmer in South Gippsland assured me that he had made ensilage out of every green plant on his farm except bracken fern, and had had success with the lot. As the green feed turns to dry, so does the milk supply fall off and the cattle generally get into poor condition. Generally during the spring there is plenty of superfluous green feed, and the idea of the silo is to enable the farmer to conserve this and carry it on for the summer months. No other way of conserving the feed is equal to the silo. In dry stacking all the natural juices are lost. No farmer would think of stabling his stock in the spring of the year and feeding them on purely dry feed. Why then not have the same consideration in the summer and supply feed containing the same luscious juices at the time most needed. The cattle are kept in better health with the regular ration of ensilage, the returns are materially improved, and there is less danger of such troubles as impaction and cripples. The stock relish the food, and seem to do better in every way.

#### A VICTORIAN EXPERIENCE.

About 10 years ago I was in the mallee in Victoria during the big drought, when stock were dying in every portion of the State. One man had foreseen the advantages of silos, and erected several during the good seasons preceding the drought. The result was that he was able to keep all his own stock in good condition, purchase sheep at as low as sixpence per head, keep them alive with ensilage, and when other men were losing their stock and money this man was building up

sufficient to enable him to retire. His ideas have now been followed by many others with beneficial results. No commercial concerns are considered sound unless there is a decent reserve fund to fall back upon. Silos for the farmer simply hold his reserves and make him independent of droughts, bad seasons, bush fires, pests, or vermin. Just imagine the happy position of any farmer during the 1914 drought with chaff selling at over £12 per ton who had had the foresight to equip his farm with a silo. Compared with the saving of money in such a year the cost of the silo is not worth considering. Those about to construct a silo I would refer to Bulletin No. 1 on Silo Construction, issued by the Department of Agriculture (Victoria). This gives full particulars of all materials required for every kind of silo, also plans and specifications and estimates of cost. An iron or wooden silo of 100 tons capacity can be erected for under £100. There is no doubt that soon a silo will be looked upon as a necessary corollary to every farm. A farmer without at least one will be considered out of date and without ambition. No farm is complete without a silo; ensilage keeps up the dairy returns, keeps the stock healthy and thriving, enables the farmer to carry more stock, spurs him on to better efforts in all his farming pursuits by increasing the profits of his farm, it also increases the fertility of his soil by keeping down weeds. No one who has fed ensilage to his stock would hesitate for a moment before stating that it is the duty of every farmer to equip his farm with a silo.

In answer to questions Mr. Crawford said that Mr. Foster, of South Gippsland, had erected two silos, and during the winter his dairy returns kept up almost to the same standard as in the spring.

Mr. Warren said that good oaten hay with crushed oats gave far better returns for cream production than ensilage.

Mr. Colebatch said that in comparing hay and ensilage they were overlooking what was wanted, and that was to obtain a succulent feed which would maintain the flow of milk at the same high rate as the green feed in spring time. Ensilage was advocated for the smaller man whom they were asking to make a similar revenue on a small block of land. They wanted him to produce enough fodder to carry the herd and give a decent return all the year round. It was not fair to compare the value of silage as food with hay, because the food value of silage was enhanced by the fact that it was available in the season when it was of most use. In the height of summer ensilage would bring higher values than any dry feed. He did not advocate every farmer making silage, but the small farmer should apply himself to the question of silage for use as fodder in summer time.

Mr. F. Coleman pointed out that silage was not to replace hay, but to provide something in case of emergency—a sort of reserve fund in the time of drought in districts which were not naturally adapted to dairying. Dry feed did not take the place of the succulent, juicy feed which was obtained in the spring, but the silo made a good substitute. However, only the best material should be put into a silo, and if one had a good crop growing it would pay better to put it into hay than into silage.

# QUESTIONS AND FREE PARLIAMENT.

## NOXIOUS WEEDS.

Mr. F. J. Flett (Salisbury) moved—"That this Conference of representatives of the Lower North, through the local Branches, urges all landholders and occupiers to take active steps to eradicate noxious weeds." Mr. W. Sibley (Angaston) seconded the motion.

Mr. E. S. Matthews (Angaston) moved as an amendment—"That this Conference requests the Government to see that the District Councils carry out more strictly the Noxious Weeds Act." Mr. W. Patching (Angaston) seconded the amendment. The amendment was carried.

## NEXT CONFERENCE.

It was unanimously resolved that the next Conference be held at Blyth, in October next.

## EVENING SESSION.

Mr. D. F. Laurie (Poultry Expert) delivered an address in which he dealt with the commercial side of poultry raising. There was no branch, he said, of the agricultural industry which he knew of that offered bigger prospects and was more likely to advance than the poultry industry, because they had an assured outlet for all their products, and more production was badly required. The supply was greater than the demand before the war. Five or six years ago the United States were exporting large quantities of eggs and table poultry to England. Just before the war, in 1914, the United States had established large buying centres in France, the North of Ireland, and elsewhere to supply the American demand. That was because the enormous population of America had caused the demand to overtake the supply. The annual value of eggs and poultry in the United States was £220,000,000, and it was the biggest industry there. The industry could develop in the same way in South Australia, but it must be conducted on right lines.

## THE FARMERS' LOSS.

Some years ago he went into the matter very carefully, and he found that the farmers were losing £60,000 per year by marketing bad eggs and bad packing. Farmers imagined that when they sold bad or doubtful eggs to the storekeeper that the storekeeper or the man in Adelaide would bear the loss. It was not so. The loss always fell on the producer. Eggs which came down to Adelaide were tested. Not all, but many of them, especially eggs for export, and the bad ones were rejected. Eggs of inferior quality were not suitable for packing and sending to the Sydney, Melbourne, or West Australian markets. When the merchants there found that 20 or 30 per cent. of the eggs were useless they had to allow for it, and the consequence was that they gave so much less for Adelaide eggs because they were doubtful, and the loss fell upon the producer. If the eggs sent to market were fresh and fertile they would be worth 3d. per dozen more. Until producers recognised that all eggs must be in the very best condition, they would have trouble. He heard people boast of the class of cattle, sheep, and pigs they produced, and they should take the same pride in the eggs they produced. Whoever sold eggs should be in a position to guarantee them as fit for human consumption. Legislation should be introduced to deal with the question, and people should not be allowed to sell stale eggs. The egg export industry was worth £150,000 per

annum, but it could be raised at once to £200,000 by proper methods among the egg producers. The man whose eggs were guaranteed received 1d. or 2d. per dozen above the market price.

#### THE PROSPECTS OF PULP.

Prices in England recently induced traders to pulp 130,000 dozen eggs here and send them to London. They cost 8d. to 8½d. per dozen and realised a good profit. It was noted as the best pulp on the London market, not only in appearance, but in quality. He would like to see the producers themselves under the organisation of a Government Department send their own eggs to London. It would pay them during the next few years to send eggs in pulp to England. The result would be that the price of eggs in Adelaide would never be less than the net price in London. He urged them to keep up the size of the egg. Many people expected the same price for mixed eggs or small eggs as large ones. But if people paid 1s. per dozen for eggs they wanted a shilling's worth. In all markets except South Australia regard was paid to the size of the eggs. They were not sold by weight, but by the long hundred. Those up to a certain weight were sold at a price which increased with the weight of the eggs. No country had gained more by the grading of eggs than Denmark, which was essentially the country of small holdings, but where they had taken care that everything they produced was first class.

#### MARKETING FRUIT.

Mr. Smith (Angaston) moved—"That the military authorities be asked to do all in their power to make it possible to supply soldiers with dried fruit as part of their ration." Mr. Hammatt seconded the motion. Motion carried unanimously.

#### STANDARD FRUIT CASE.

Mr. F. Moore moved—"That the terms of the standard fruit case regulation be altered in order that it may apply only to the metropolitan area." Mr. Hammatt seconded the motion. The motion was carried.

Votes of thanks to the Lyndoch and Rosenthal Branches, to the officers of the Agricultural Department, to those who had read papers, and to the Chairman were carried by acclamation, and the proceedings closed with the National Anthem.



#### Conference of Mid-Northern Branches—Held at Laura.

The conference of Mid-Northern Branches of the Agricultural Bureau was held in the Town Hall, Laura, on Thursday, March 8th. Mr. R. Lines, chairman of the Laura Branch, presided, and there were also present on the platform Mr. G. Jeffery, Vice-Chairman of the Advisory Board; Professor A. J. Perkins, Director of Agriculture; Mr. E. H. Tuckwell, member of the Advisory Board; Mr. D. F. Laurie, Poultry Expert; Mr. George Quinn, Horticultural Instructor; Mr. H. J. Finnis, Acting Secretary of the Advisory Board; Mr. W. Mills, Mayor of Laura; and Cr. T. W. Higgins, Chairman of the Booyoolie District Council.



### OPENING CEREMONY.

The chairman, on behalf of the Laura Branch, welcomed the officers of the Agricultural Department, delegates, and visitors to the conference. Laura appreciated the honor of the conference being held there, and he hoped that all who participated in the proceedings would go away satisfied. He had much pleasure in calling upon the Mayor to welcome the visitors.

The Mayor said he had great pleasure in welcoming, on behalf of the citizens of Laura, the visitors to their town.

Councillor Higgins, Chairman of the Booyoolie District Council, also welcomed the visitors.

### OPENING ADDRESS.

Mr. G. Jeffery, Vice-Chairman of the Advisory Board, said he appreciated the remarks made by the chairman, and lustre had been added to the occasion by the presence of the Mayor of Laura and the Chairman of the Booyoolie District Council, and he thanked them. He had to apologise for the absence of the Minister of Agriculture, who wished to be present, but business of an important nature made it impossible for him to attend, and therefore he, as Vice-chairman of the Advisory Board, had to open the conference. They were passing through very troublous times, the like of which none of them ever expected to experience, and they all hoped and prayed that, in the near future, that terrible war which was engulfing the world would be concluded, and that the British arms would come out victoriously, because they were not only fighting for national safety, but for the civilization of the whole world.

### AGRICULTURAL PROSPERITY.

Along with the fearful war times had come an era of prosperity in agriculture altogether unequalled, and they had no end of reason to be thankful for the blessings which had fallen upon them. It seemed strange to him to hear complaints come from agriculturists about the wheat scheme. He took a keen interest in it as a business man, and when it was remembered that farmers were receiving 4s. 3d. per bushel for their wheat from the pool—that was a rough and tumble estimate—they must recognise that it was a higher average f.o.b. than had been obtained by the agriculturist for the past ten years. Added to the high price there was the fact that during the past two years they had abundant harvests. Last year they had 30,000,000 bushels of wheat in South Australia, and in the current year they would have something like 40,000,000 bushels. That, at 4s. 9d. per bushel, meant a sum which they could calculate for themselves. Farmers had no reason to fear anything, because their interests were being carefully watched and conserved.

### THE WOOL CLIP.

The Government had also purchased the balance of the Australian wool. He was at the first meeting convened by the Prime Minister to discuss the scheme, along with representatives from the whole of Australia, and he could say that there was nothing else possible but for the Government to take the clip. The difficulty they had to face was not the fact of taking over the clip, but the price they should get. In that

respect they were ably helped by the Prime Minister, with the result that there had been no fighting at all. The prices adopted were the highest ever paid for all classes of wool. If there was one class of sheepgrower who had more reason than another to be thankful for the arrangement it was the small man, who had been protected in a way which he could not have been before. All classes of wool were provided for, even the "dags," and they got full market value for them. The experts from all over Australia met and seriously discussed some means of bringing about the fixing of a price by which each man should receive his fair share. A scheme was adopted whereby a price almost equal to the then current rate should be set down as a basis. That was worked out, with the result that, as far as they could see, the whole of the clip would come in at something like 1s. 2½d. per lb., which meant that there would be something like 1d. to divide amongst those growers whose wool had been sold under the scheme; so that, in addition to the 10 per cent. which had been kept back to cover possible contingencies being refunded, the chances were that the farmers would receive from 5 to 10 per cent. Considering the high prices for wool and wheat, he was justified in saying that the agricultural interests in Australia, and particularly South Australia, never looked brighter. They must face their difficulties, and their duty would be to endeavor to produce more than ever, and help not only the national interests, but their own. It had been said that the man who made two blades of grass grow where one grew before was a benefactor to the State, and the time was never more ripe than the present for such a statement to be made, and he trusted that the work of the conference would be in that direction. He wished the conference every success, and he hoped that they would leave it happier and better informed than when they came. He declared the conference open. (Applause).

Water, and its application to fruit trees and vines, formed the subject of an address by the Horticultural Instructor (Mr. Geo. Quinn). Mr. Quinn's remarks are printed elsewhere in this issue.

#### BEST WHEAT FOR THE DISTRICT.

A paper, which will be found printed on page 1122 of the July, 1915, issue of the *Journal*, was read by Mr. F. T. Hughes, of the Laura Branch. An animated discussion followed.

#### EGG PRODUCTION.

Mr. D. F. Laurie, the Poultry Expert, dealt with the question of egg production, and advocated the necessity for marketing a larger egg and a fresher egg. The latter quality could only be obtained by the production of infertile eggs. After the war there would be a big market overseas for eggs, but the trouble was that there would not be a sufficient quantity of eggs gathered to supply the demand. They must increase production, because at present they had no surplus to send to overseas markets. He would like to see a Government department formed to conduct the overseas trade in the producers' interest. In that district they were in a most fortunate position, because they

had the Port Pirie and Broken Hill markets at their disposal, and they could breed both for egg production and table birds.

In reply to questions as to diseases of poultry, Mr. Laurie said that over 90 per cent. of the sickness in poultry was due to ticks and other vermin.

#### DEEP AND SHALLOW CULTIVATION.

A paper with this title was read by Mr. E. G. Blesing. (For the text of the paper see September, 1915, issue of the *Journal*, page 188). In discussing the subject, Professor Perkins (Director of Agriculture) said that he knew opinions varied as to the depth of ploughing most suitable, and if a referendum were taken amongst farmers it would probably be in favor of 2in. in South Australia. It was a question whether the shallower methods of the present day were not likely to be changed in the future, and whether they would not be compelled to cultivate somewhat more deeply. He agreed that deep ploughing involved extra expense in several ways. The ploughing was more expensive and so was the subsequent tillage. The theory had been advanced that the moisture available for the crop would be found at the depth of the ploughing. That was incorrect. It could only be correct if the farmer cultivated and scarified his land to the same depth, and no one in his senses would do that. Personally he had had a fair amount of experience in deep ploughing, in a district whose rainfall was better than Port Pirie, but still not very heavy—something like 17½in. The depth they had worked on the whole of that farm for years was 7in., and the crops—where the general average of the farm, running over a period of years, was 18bush.—had been in favorable years 30bush., 35bush., and even 40bush. to the acre, and that was on comparatively deep ploughing. It was absurd for a man to say that deep ploughing was no good when he did not practise it. One year's trial on 10 or 20 acres was of no value. It was only by a systematic series of tests over a number of years that the merits of shallow and deep ploughing could be compared. The average farmer could not speak on the subject, because he had not tried. He had set up a series of experiments at Roseworthy, and the present was the sixth season. They had a series of alternate blocks an acre in extent, and they were ploughed to the depths of 2in., 4in., 6in., 8in., 10in., and 12in., the depths being accurately measured. They did not anticipate that the 10in. and 12in. would be commercially valuable, but they were simply for the purposes of comparison. Speaking from memory, the average over the six years had been in favor of the 8in. ploughing. In no case was the soil spoiled by the deep ploughing, although the 10in. and 12in. ploughing had not yielded crops proportionate to their cost. Then there was the aspect whether the deep ploughing had cost more than the value of the increased yield. There was one matter sometimes lost sight of, and that was that a good deal depended on the time of the year at which it was practised. There was another point; many people were afraid that if they brought the subsoil to the surface the soil was ruined. The old idea of trenching up inches and possibly a foot of the subsoil and putting it on the surface was not a good one, but it was quite possible to deepen the soil gradually.

taking up possibly half an inch at a time. They should give it time to mellow, and in 10 years they would have deepened the soil two or three inches; and so on from 3in. to 6in. It was only by doing it gradually that it could be done without ill effects. They should do what they found best, but the time would come when they would have to alter their methods, and he was sure they would adopt deeper ploughing to a certain extent.

#### NEXT YEAR'S CONFERENCE.

Mr. Curnow invited the delegates to fix next year's conference at Wirrabara. Mr. Weston invited the conference to meet at Crystal Brook. The conference decided to meet at Wirrabara.

#### FREE PARLIAMENT.

##### MICE IN HAY.

Mr. Curnow (Wirrabara) asked if members could give any information in regard to any method which might be employed to prevent mice destroying hay. One farmer had tried sulphur, and said it was effective.

Professor Perkins said that in England haystacks were often built on piles with inverted pieces of iron beneath to keep the mice away. Possibly they might be kept away with galvanized iron let into the ground. He thought sulphur might be dangerous.

Mr. Stephens (Port Pirie) said that he had tried sinking galvanized iron in the ground, and it acted very well if put down in time.

Mr. G. Quinn said that a gentleman in Angaston had shown him a method of sprinkling sulphur on haystacks, and he said it was a perfect preventive against the mice.

##### YELLOW CLAY SOIL.

Mr. Curnow inquired the best manure to promote growth and improve the quality of yellow clay soil.

Mr. Quinn said that the first step would be to improve the texture of the soil, and he could suggest nothing better than lime as a dressing at the rate of 15cwts. to a ton per acre. As a first application it would improve the land very much. In the following year he would apply 2cwts. to 4cwts. of bonedust or super. and he would put 1cwt. of potash to the acre with the bonedust. At the end of July or August he would put in 1cwt. of sulphate of ammonia to the acre, and the result would be very marked.

##### WHEAT RECEIPTS.

Mr. Sergeant moved—"That the present system of weighing wheat is unsatisfactory, and that the agent should give a receipt showing the weight of each bag."

Mr. R. E. Lines seconded the motion, which was carried.

During the evening session an address was delivered by the Director of Agriculture, and subsequently visitors and delegates were the guests of the Laura Branch at a supper held in the Town Hall.

## WATER.

### ITS APPLICATION TO FRUIT TREES AND VINES.

After some 20 years' experience travelling about all the States, and observing the production of fruit trees and vines, said the Horticultural Instructor (Mr. Geo. Quinn) in the course of an address delivered before the Conference of Mid-Northern Branches of the Agricultural Bureau, he was forced to the conclusion that, as far as South Australia and a very large proportion of the other fruitgrowing parts of Australia were concerned, water was the only means by which they were going to raise the production of fruit from being an extremely precarious mode of life to one of established profit. About 14 or 15 years ago an old resident of that district told him frequently that it was very important to urge on the people to try and get a water supply in their orchards. He did not think deeply about it then, but every year it had impressed him more and more strongly that if they were to progress extensively in fruit and vine culture they must have greater supplies of water.

### THE FUNCTION OF WATER.

The necessity for water was twofold—(1) to dissolve the constituent minerals in soil to make them available for plant food, and (2) to keep the succulent parts of the plant in a turgid, growing condition so that the nutriment might pass through the plant in functional order. Plants needed very great supplies of water. Moisture was essential to dissolve what was taken from the soil, so that it might be absorbed by the plant, because nothing was taken into the plant from the soil except when it had been dissolved in the soil moisture and passed up into the different parts of the plant. The plant system required so much more than what would appear likely that he could best illustrate it by reference to a writer on cereal crops, who stated that for every pound of dry matter in the formation of the oat crop 300lbs. of water had to be passed through the plants. That would give some idea of the weakness of the solution passing through the plant to build up the solid substance.

### SOURCES OF SUPPLIES.

In that State the sources of supply might be classed under three heads—(1) Running streams, of which they had a limited number; (2) surface catchments, reservoirs, dams, &c.; and (3) what were more widely used and distributed, the subterranean sources of supply in bores and wells. If they compared those sources of supply and their comparative value to the plants themselves, they found that their streams, with the exception of one or two—and they sometimes failed—were running fresh in the winter season, when they did not want to irrigate, but in the summer time they decreased in volume and increased in solids, so that in January, February, and March, when the ground was at its driest and they wanted great volumes of moisture, their streams were of the least value to the plants. The supplies from reservoirs and dams were the purest form of water which they had, and tests they had made in the last few years showed that there was no more valuable source of supply than that conserved from the surface during the winter season.

## SUBTERRANEAN SUPPLIES.

The water taken from wells, bores, and subterranean sources was always impregnated more or less with injurious saline substances. Owing to the soil through which it came, the water in the shallower wells was more likely to be impregnated with saline matter, and they were, to a very great extent, tampering with dangerous weapons in using them. In the analyses which had been made of their subterranean water, it had been found there were various salts, including common salt and chloride of magnesia. They also had sulphate of magnesia, an impure form of Epsom salts, but the carbonate of soda, which gave rise to the "black alkali" of the American writers was seldom found in our waters in injurious quantities. It was only chlorides, however, of which they need take much notice in their well and bore water. Through the Chemical Department a great many analyses has been made, and out of 19 samples taken along the gravelly beds of the Torrens Valley they got an average of 50gr. per gallon, and as there were 7,000gr. in lb. they could easily ascertain the amount of saline matter which would be put into the soil with the water they were using. Of the samples analysed the most highly impregnated reached 102gr. per gallon, and the lowest was 19gr. In the clay soil, out of 24 wells and bores examined the average was 123gr. of dangerous salts to the gallon. The highest was 324gr. and the lowest was 41gr. taken on foot of the hills near Mitcham, which would give them an illustration of the plains towards Findon. That would give them the percolation of the water how those salts were collected during the percolation of the water through the soil layers which contained them.

## THE LIMIT OF SAFETY.

They had little experience as to what would be a too strong a solution to apply, and they had to fall back on American investigations, but he hoped, as time went on, they would have their own data as to the different actions of different strengths of saline practice. The American statement was broadly that in ordinary practice 70gr. of salts of all kinds per gallon was the limit as they used exclusively for irrigation. In using water practically as it is in the Murray Valley, where the rainfall was entirely on irrigation, negligible quantity, and the plants depended almost entirely on irrigation, the limit of safety (according to Hilgard) would be 70gr. of injurious salts per gallon for continuous use. In a fair proportion of their fruitgrowing area they were dealing with an 18in., 24in., and 30in. rainfall on soils which were well drained, and when they used water of local experience as far as it would go—chiefly gained on the Adelaide Plains—they could feel assured that under those conditions of rainfall and soil they could in their irrigation schemes use much more impregnated water than the figures which he had quoted from Professor Hilgard. He had known some gardens where water highly impregnated with saline matter, equalling 70gr. or 80gr. of chloride per gallon, had been used for 20 or 25 years, and there was no evidence that those orchards had been affected by the saline contents of the ground, however, was thoroughly well under-drained, and the rain might wash out in the winter the saline matter which was brought in during the summer's irrigating. On some of the more stiff soils

with clay subsoils beneath them, orchards on the plains of Adelaide had afforded evidence that the salt water had been operating injuriously for 20 years.

#### THE APPLICATION OF WATER.

In regard to the methods of applying water artificially to trees and vines, they had three commonly recognised practices, viz., (1) flooding, or covering the whole surface; (2) running the water in furrows or trenches around the trees; and (3) sprinkling overhead. Flooding involved the possession of a large volume of water, but it had the advantage that, where saline waters had been used, they could practically dissolve out most of the accumulated salt, but then they would just as readily dissolve out a lot of the valuable salts, which made plant food. Flooding had the disadvantage of solidifying the soil very rapidly, and though it saturated the average soil better than other methods, the solidification was a great evil, and the loss by evaporation was very much greater. Consequently, to keep the soil in good, wholesome condition, flooding involved deep and prompt cultivation immediately after each irrigation, or the percentage of loss by evaporation would be something to be taken into consideration, quite apart from other attendant evils.

#### FURROW IRRIGATION.

Supplying water by means of furrows or trenches was less wasteful, but it took longer to supply a sufficiency of water. However, it allowed more leisure in cultivating the surface after irrigation, and the evaporation was less. The soil, by such a process, was not consolidated so rapidly, because the action of the sun was not so severe on the broken up places between the furrows, as it would be if the whole of the surface had been covered by flood. There was also less draught on the animal in cultivating the soil, and there was not so much necessity for deep scarifying after each irrigation. In furrow irrigation they had to determine whether the water should be run on quickly or gently. The rate at which it should be run depended on the nature of the soil through which it was passing, and the slope of the land. If it were sandy soil it should be run quickly, but if it were stiff clay soil they must take a good deal of time, because effective irrigation under such conditions was a slow process, and if they hurried it they would find that they had not wetted the ground. Therefore, in irrigation by trenches they had to consider what was the proper period of time to give each particular plot of land to allow the water to soak through the intervening soil from one furrow to another.

#### SPRINKLERS.

In regard to the third system of irrigation, that of sprinkling, he had little hesitation in condemning it, except for lucerne and cover crops, but it had one advantage in that it economised in the amount of water used. There was a system of sprinklers in use on the Murray, and he had nothing to say against them for their particular purpose. Though sprinklers had the slight advantage that they dissolved the injurious salts in the soil better than furrow irrigation, but not so well as flooding, neither was this method so likely to wash these salts out into the drainage below. Sprinkling tended to consolidate the soil even deeper than rain, and formed what was called "hard pan" beneath the cultivated surface layers.

## THE CAPACITIES OF SOILS TO RETAIN MOISTURE.

Another consideration in irrigation was the water-holding capacity of the soil. He did not mean soil that would not allow water to pass through it, but soil which held a large supply in the interstices between its particles. He had a table, prepared by an American, Professor Clinton, of Cornell University, New York, which showed that one cubic foot of pure sand would hold 27lbs. of water in suspension between its particles. The water plants ordinarily used to sustain their growth was not the free water found flowing underneath in the form of springs, but it was by means of the water which clung in the spaces between the particles in the soil known as capillary moisture, in which the plant drew its nutriment. It passed laterally, or up or down, and this was a very important point to recollect in connection with getting the fullest value from water used in irrigation. A sandy clay soil held in suspension 38lbs. per cubic foot; loamy clay, 41lbs.; brick clay, 45lbs.; humus, which was composed principally of decayed vegetable matter, 50lbs.; and good garden loam, which was the ideal they aimed at, 48lbs. A glance at these figures showed that they could improve the texture and fertility of the soil for the growing of trees and at the same time improve its water-holding capacity.

## WINTER IRRIGATION.

In the winter season, if they had the soil well drained underneath, and they ran the water through the trenches and filled the soil with as much as it would hold in suspension, that was the cheapest and best way to start upon the irrigation of deciduous trees and vines. It would be much easier to store water deeply throughout the soil when the particles of the soil were charged with water than in the summer, when they were not, and the upward pull of evaporation was at its strongest.

## AFTER TREATMENT OF THE SOIL.

In regard to the treatment of land after it had received the water—and he was assuming that most people adopted the furrow or ring system of watering—there was too much tendency to neglect a prompt policy in the application of thorough tillage after the water had soaked away. In opening the furrows they should make them as deep as possible, 7in. or 8in., or if done with a spade, more. The ground should be soaked thoroughly by running the water through slowly or a number of times. If they wished to put in fertiliser, in small plantations at any rate, they should make a greater ring, 2ft. 6in. wide, and 7in. or 8in. deep, and spread the fertiliser right around on the broken up bottom, and then turn the water into that. In that way the manure would be scattered in the spot where the roots required it, and the trees showed the results very quickly. It was essential that when the ground had been irrigated the soil should be cultivated immediately it was dry enough not to puddle, and the finer the tilth the more it would retard the bringing of the moisture to the surface and its evaporation into the air. If they only stirred the soil an inch in depth after irrigation it would save some of the moisture they had put into the ground. But if they pulverised it for several inches deeper a greater volume would be retained for the use of the plants, and that over a longer period.



The aim of the irrigator should be to wet the whole soil body occupied by the roots if possible, and to put the water down to the roots rather than induce the roots to come up to the water. The best way to ascertain whether the trees needed a drink was to test the sublayers of the soil rather than hold off until the plants themselves hold out signals of distress. The latter stage was usually an indication that injury had been done before the moisture became available, and its application then often proves it to be not an unmixed good, particularly to citrus trees of a fruit-bearing age.

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## MORE LIVESTOCK ON THE LAND.

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In addressing the Conference of Mid-Northern Branches of the Agricultural Bureau Professor Arthur J. Perkins (Director of Agriculture) said that he would like, on occasions of that kind, to speak on subjects of interest to the whole district, and he commended to them a suggestion which had been made, that the Branches interested in arranging the Conference might, sometime before the Conference, send to the Secretary of the Advisory Board a list of questions in which they were interested, and which they would like discussed. A practice of this kind would give time to work the answers up and to develop arguments which would make them convincing, instead of being compelled to answer *ex tempore* any question that might be brought forward. He had tried the method he suggested in other districts and had found it answer better even than a set address on any given subject. He looked upon that Conference as representing probably some of the richest and best of the State's agricultural areas, and in stating that, he implied a good and assured rainfall, and what he would have to say turned upon that particular point of view.

### INCREASING LAND VALUES.

There were quite a number of ways in which a district such as this might, in course of time, point the way to others, since there was one very powerful stimulant which forced people to make changes in practice, and that was development and increase in the price of land. The owner of the land might say that he did not suffer if his returns continued the same, even though the price of land went up, but there came a time when the younger generation came along and found that if they sold the land and took bank interest their income would be

greater than if they continued to farm it on the old lines. If they took the farming practice in that district, or in districts similarly situated, they knew that wheat and bare fallow followed regularly one after the other. In the end that meant that they were making two acres do what in other countries one acre was doing, or they were taking two years in growing a crop of wheat instead of one, or, if the land was worth £10 per acre, they were to all intents and purposes growing wheat on land worth £20 per acre. Now they wanted to see whether, by some means or other, they could not make higher average returns from the land. They found, in the past, in other countries, that land had been treated very much as it was being treated in this State, but as land values went up other methods were adopted. One of the first plans adopted was to grow a second crop—not necessarily wheat. There were many districts in which it could be done in South Australia. They could have bare fallow, wheat, and some other crop, and by using the land for an additional season reduce the loss of letting it lie idle for 12 months. Then it would be possible to carry more livestock, and it was on that question chiefly he wished to engage their attention.

#### THE AVERAGE FARM FLOCK.

The number of farmers who had livestock to the capacity of their land and farming operations was very limited. A farmer usually carried a small number of sheep, equivalent to the carrying capacity of his pasture at the worst time of the year. Such a policy reduced him to a very limited number of livestock. On stations sheep have been kept for several generations, and certain ideals have been formed, namely, that the land must not be overstocked, and that no more sheep could be kept than the land would carry in the worst kind of year. With farmers, similar ideas seem to have been adopted, but they should rather endeavor to follow the practice of other countries in which sheep were maintained on land which was not managed on station principles. That was what should happen in this State, especially in a district such as this. Farmers said that if they had more sheep than they could handle on the natural pasture the sheep would lose condition and possibly die. They forgot that in most countries in which sheep were fed and handled in that way a profit was made, and sooner or later they would have to come to the same practice in South Australia. Some years back he had prepared a paper showing the carrying capacity of a farm like Roseworthy, and he would quote one or two of the points he made. First, over a period of nine years they carried roughly a sheep to the acre on a comparatively large farm of about 1,900 acres. They never had one-third of the area out of tillage. That was accomplished, not by restricting the sheep to natural pastures, but by hand-

ling them in the proper way and hand-feeding them for periods which never exceeded three months. There was no question that the natural herbage on well-conducted farms was very rich, and that they could keep a larger number of sheep than on station property. In 1905 the equivalent of three or four sheep to the acre were carried on some Rose-worthy fields. That did not mean that three or four sheep to the acre were put on a field and kept there for a year, but it meant that they were put in a field for a time, and then changed to other fields, brought back again, &c., a record being kept of the number of days they were on and the number of days they were off a particular field. That was not quoted as the normal capacity of the land.

#### CROPS FOR FEEDING OFF.

The whole position was that the farmer would have to decide that portion of the crops he grew were not saleable crops in the same sense that wheat was, but they would have to determine to grow crops which could be fed down, the advantage of the practice being represented by the proceeds of livestock sold in the market. It was worth while emphasizing the advantages derived from a practice of that kind. They knew that the constant practice they followed of bare fallow and crop had an effect which must operate against the mechanical condition of the soil sooner or later. The more land was treated as bare fallow and the more perfect the practice the more the organic matter in the soil, which was essential to fertility, was destroyed. The practice was satisfactory as long as the land was new, but in time the land began to fail and lose its original fertility. This difficulty could be dealt with artificially by dressing the fields with farmyard manure, but it was an expensive practice, and, though adopted in other countries, where labor was cheaper and fields smaller than in this State, it could not be recommended here. There was no cheaper method than that of turning livestock into the rank strong growing crops. It was the practice in England at one time when they manured land, to put one sheep to the square yard on it for 12 hours, and the droppings in that time were regarded as equivalent to a light dressing of farmyard manure: 24 hours were regarded as an average dressing, and 36 hours as a heavy dressing. A sheep to the acre per year represented from one-half to three-quarters of a ton of organic matter per acre. A rank crop like kale would carry 20 sheep per acre for three or four months, and that meant a large amount of organic matter applied to the soil. Keeping livestock in larger quantities ought to be not only directly profitable, but there was that indirect advantage which would be reaped in time in the shape of the increased yields of crops when land of that character came under ordinary agricultural operations.

## SMALLER FIELDS NECESSARY.

When he took over Roseworthy in 1904, he was imbued with the idea of stocking it up. There were then 120 sheep or thereabouts on the farm. From the outset he was faced with the difficulty that the fields were too large—200 or 300 acres in extent—and he soon realised that he could not keep large numbers of sheep on a farm in that condition. He set about subdividing the fields, a long and expensive process. It was out of the question to attempt to keep an adequate number of sheep on the large paddocks which obtained in South Australia. In such conditions the keeping of livestock was possible, not in proportion to the area grazed, but according to the number of fields at one's disposal. The first item, therefore, towards augmenting the number of sheep was to increase the number of fields. It was the general experience on a farm that a large number of fields was needed to put a large number of sheep on a relatively small area. So that they could be shifted constantly from field to field, in order to give the grass time to grow, and to give the sheep constant change. At the present time such work was more expensive than ever, owing to the cost of wire, labor, &c. Then there was the question of water. If there were many fields there would be as many points where water would have to be provided, because it was not a wise practice to drive animals constantly to water. It was necessary, therefore, to have reticulation, and that could be provided, even if they were not connected with the Barossa or Beetaloo water schemes. Whether the supply was from wells or dams they could reticulate by means of a windmill or storage tanks. Two things therefore stood out in augmenting their flocks of sheep, and they were that they must have small fields, and they must have water. There was also the difficulty of fencing. One of their inheritances from station methods was the station fence, which was altogether inadequate for farm purposes. Good fences were essential. It was better to have an extra wire or two, and make the fences quite sheep-proof. He thought eight wires were necessary, but perhaps seven would do. With Cross-breds, if there was a crop on the other side of a six-wire fence they would get through; seven wires on a swinging fence he had found effective sometimes. Then there was the question what would be a reasonable number of sheep to keep on a decent sized farm. At Roseworthy he kept a sheep to the acre, but, given average conditions, and there were districts better than Roseworthy, and some very much worse, he felt sure that in fair country, if they had one-third under crop and one-third bare fallow, they could keep, with careful management, two ewes to the acre on the land that was left for grazing pastures, provided they were prepared to grow grazing crops in reasonable proportions. They could thus carry 400 ewes on a farm of 600 acres.

helped along by grazing crops and hand-feeding wherever necessary. A mistake was often made by not feeding the livestock until the pastures were bare, but they should look ahead and commence hand-feeding whilst there was still feed in the fields.

#### THE FARM SHEEP.

As to the kind of sheep to keep, his opinion was that, excellent as the Merino was on the station, and despite the many advantages it presented for farm purposes, it was not equal to good long-wool crosses of the half-bred Lincoln or Leicester type. The half-bred ewes made better mothers, and looked after their lambs better, and when they came to the question of fleece it was always of good, saleable type. With handfeeding, while the Merino would take the food when driven to it, the Crossbred sheep would take it readily. They kept their condition better than Merinos under adverse conditions. Another advantage which Crossbreds possessed over the Merino was that they bred more readily as two-tooths. He had therefore personally come to the conclusion that for farm purposes the Crossbred sheep was preferable. He had tried to outline what appeared to be the line of improvement which was likely to relieve the more pressing wants in farming districts where land values were likely to rise, and he felt certain that, in the course of time, they would gradually work down to something of the kind. They should recollect that by increasing the livestock which their land would carry, they were tending not only towards benefiting themselves, but also the whole State.

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#### BOT FLIES.

The constantly recurring question as to whether bot flies bite or sting can be settled by any man of ordinary observing powers if he will catch one and see that it has no puncturing apparatus in its mouth and no sting behind. The thing that is mistaken for one is the egg-laying shoot, the ovi positor. A member of the Advisory Board recently lost a mare by accident, and like a wise man, made a *post mortem*. The stockman of long experience who made it said it was the first horse in which he had not found bots. The reason for their absence was that the owner made a practice of wiping over the chin and back of knees with kerosine and oil before starting out. Like the conjurer's tricks, it is simple when you knew how.—FRAS. EVELYN PLACE, B.V.Sc., M.R.C.V.S.

## VINES.

### FUNGOID DISEASES AFFECTING THE VINE, AND THE GRAPE CROP FAILURE.

The morning session of the Conference of the Lower Northern Branches of the Agricultural Bureau was of particular interest to those engaged in vinegrowing. Mr. H. E. Laffer, Viticultural Instructor and Lecturer at Roseworthy College in viticulture, fruit culture, and oenology, contributed a paper on fungoid diseases of the vine, and Mr. A. Springbett, of the Angaston Branch, read a paper entitled "The Grape Crop Failure."

Mr. Laffer, in the course of his paper, said:—Of all the diseases affecting the vine, by far the greater number are of fungoid origin. These fungi represent some of the lowest forms of plant life, and are mostly of a parasitic nature, living upon the tissues of the host plant, and drawing therefrom the nourishment wherewith to carry on their own life processes. In this manner they have an exhausting effect upon the vine, diverting the sap from its normal course, and depriving the affected plants of their means of sustenance. Many affect the growth and foliage, reducing it to such a condition that it is unable to perform its proper functions. Even if the injury so caused is not of a very serious nature, the harm done is indirect, and other parts of the plant, particularly the fruit, suffer, because the foliage is unable to carry out the physiological functions for which it is responsible. The fruit bunches are so injured, in some cases, that even if not completely denuded of berries, the fruit becomes more or less useless by reason of its distorted and injured condition, or by reason of the presence of the growing portions of the fungus or mould.

#### CONDITIONS FAVORABLE TO DEVELOPMENT.

There are certain conditions essential to the development of these diseases the two most important being warmth and moisture. Dry heat, in most cases, effectively checks an outbreak, while cold temperatures prevent or retard their development. We know from experience in South Australia that epidemics of fungoid diseases are very irregular in their appearance, not because they have been stamped out, but for the reason that atmospheric conditions do not favor their development. Consequently, when all conditions combine to favor an outbreak, we are, to a certain extent, caught unprepared. In the older vine-growing countries, particularly in Europe, the problem of dealing with these diseases is an annual undertaking, for they are so numerous that conditions in most years are favorable to one or the other. Speaking generally, the climate of South Australia, or Australia for that matter, does not lend itself to this class of pest, and under these circumstances it is questionable whether any costly outlay for dealing with them is necessary or would be warranted. It must be remembered that in Australia, where the bulk of our vineyards are of considerable area, and where cost of labor is high, coupled with a low average return, the conditions are very different from those of

France, where the greater number of the vineyards are less than five acres in extent.

#### METHOD OF SPREADING.

It has already been stated that these diseases represent some of the lowest forms of plant life, and their mode of propagating themselves is distinct from that of the higher plants. They develop from spores in the first instance, and transmit themselves during the growing period by fresh spores, or by throwing off portions of their growth, which in turn start new centres of infection. Most of these fungi possess the power of reproducing at an incredible rate under suitable conditions, which explains the fact that a vineyard apparently free, will in a few days become very badly affected, possibly beyond remedy for the season. During its active growth, the fungus throws up columns bearing minute more or less globular bodies, which are the summer spores, and each one of these is capable of starting a fresh centre of infection upon the same or upon surrounding vines. They may be carried long distances by wind or other means, and cause an outbreak far from the original centre. As each spore germinates the disease rapidly spreads, the myriads combining in their growth to form clearly evident masses, and the vines or their affected parts suffer accordingly. This aspect of the disease is known as the "conidial" stage, and the conidial or summer spores are the method of spreading the fungus. All these diseases must have some means of transmitting themselves from year to year, and to this end, on the approach of autumn a change takes place in the mode of reproduction. They no longer produce simple spores, but develop a stout pocket or sack, known as an "ascus," which contains a number of smaller spores. These pockets or sacks are protected by a thick cellular wall, which is capable of resisting the winter's rain. Throughout the dormant period of the vine these winter spores remain inactive upon the old wood or upon the soil. On the approach of spring, warmth coupled with moisture causes the cell wall to rupture, the enclosed spores escape, and if conditions be suitable, they restart the disease by attacking the young growth. This is known as the ascigerous stage, and is often so different to the former conidial stage as to appear like an entirely distinct fungus. Such is the case with our common vine disease, Oidium (*Erysiphe Tuckeri*), which appears to be only the conidial form of the American Oidium (*Uncinula spiralis*). For some reason or other, under our conditions the ascigerous stage is wholly or partially skipped, as is the case with the same disease in Europe.

#### HABIT OF GROWTH.

In all these fungi, as with the higher forms of plant life, there are two distinct portions. The one is devoted to the gathering of nourishment, corresponding to the root system, while the other carries the organs of reproduction or spores, and corresponds to the vegetation of the plant. The former is termed the mycelium, and the latter are known as conidiophores. The character of the mycelium has an important bearing on the remedial treatments, which are based on the nature of this mycelium. We find that it appears in two forms, and on these we are able to divide the fungi broadly into two classes. 1. The

*Epiphytic* forms, in which the vital portion of the growth or mycelium is external and is visible to the naked eye, forming a mouldy coating on the affected portion of the vine. In this class the spores alight upon the young wood, leaves, or fruit, and upon germination they strike into the tissues by means of a short sucker or *Haustoria*. Through this sucker it draws nourishment from the host plant, and then proceeds to traverse the outside of the tissues by the development of thread-like filaments of mycelium, which in turn develop haustoria at regular intervals. As the trouble extends the bark is pierced by countless numbers of such bodies, draining the vitality of the vine. After a time the reproduction columns begin to develop, rapidly shedding their spores for the continuation of the disease. All this class of fungi are comparatively easy to deal with provided that the remedies are applied in good time. 2. The *Endophytic* forms, in which, from the germination of the spore, all the mycelial development takes place within the tissues of the plant. Such diseases are almost impossible of treatment once they have obtained a hold, for they cannot then be destroyed without at the same time destroying the plant or the portion of it which may be affected. The spore develops and strikes inwardly, the mycelium traversing the spaces between the plant cells and extracting nutriment from them. In their methods of reproduction, the spore-bearing columns arise, either by rupture of the diseased tissues or by emerging through the stomata or breathing pores of the leaves. The conidiophores may be single or branched, shedding the spores as they mature on to the surrounding foliage. This class of disease, it will readily be understood, is of a much more serious nature than the former type, and they number amongst their members some of the most destructive pests affecting plants in general.

#### REMEDIAL TREATMENT.

The principles of remedial treatment are based upon the nature of the fungus. As already stated, the epiphytic, or external growing forms, are comparatively easy to deal with after they have made their appearance upon the vine. The delicate mycelium is so sensitive to certain substances as to be readily and completely destroyed if prompt measures are adopted. As a class they are destroyed by ordinary sulphur or substances containing sulphur, such as potassium sulphide. Probably the commonest disease of this class with which vignerons are familiar is the so-called oidium, or powdery mildew of the vine. The second class, or those of endophytic origin, are far more difficult to deal with, and in a large measure the treatment is of a preventive nature. The spores must be destroyed before they can germinate and become enclosed within the tissues of the plant. To this end caustic or corrosive solutions are employed, the surface of the vine being coated while the spores are yet dormant, and the solution kills them by contact. Such remedies must of necessity be harmless to the vegetation of the vine. As typical examples of this class of fungi, we may take the anthracnose, or black spot of the vine, which has been fairly prevalent during the present season, also the downy mildew, so common in Europe. This latter is one of the very worst forms of fungi affecting the vine in the older countries, and it is interesting to note that its presence has recently been reported in Victoria. Australian climatic



conditions, however, will probably prevent it ever becoming a serious menace, although if it is about, isolated centres will always be more or less affected. Notwithstanding this, it is a disease which we can very well do without. In Europe its treatment is costly, necessitating frequent sprayings with fungicides, and its presence can, in a very short time, result in the total failure of the crop.

#### OIDIUM, OR POWDERY MILDEW.

The *Erysiphe tuckeri* is called the powdery mildew to distinguish it from the downy mildew just referred to. The conditions essential to its development are heat and a moist atmosphere, and for this reason we find that our climate is not always conducive to its appearance in the vineyards. Heat it must have to make rapid headway, and moisture in the atmosphere is essential for germination of the spores. Development commences early in the spring, when the growth is comparatively young, from 6in. to 12in. in length. It appears first as a discolored patch of a greyish tinge, usually near the base of the canes and travelling in an upward direction. Its growth at first is slow, but increases as the days become warmer. As the patches spread they can be rubbed off, and if the bark is examined closely it will be seen that there are numerous minute punctures in it. These represent the holes made by the penetrating haustoria, and in the more advanced stages they coalesce to form dark-brown patches on the mature bark. The organs of reproduction are seen by the aid of a microscope as club-shaped bodies rising from the mycelium, and which, on reaching maturity break off into segments, each being a perfect summer spore. Thus the disease is spread by these spores germinating to form new centres. Given humid conditions, it increases more rapidly as the heat rises to about 90deg. in the shade. From this point higher temperatures check its progress because they are, as a rule, accompanied by a drying of atmospheric conditions, and the new spores are unable to germinate. These temperatures, accompanied by humid atmosphere, result in extremely rapid development, and it is at this season that the great injury is done to the green fruit. Temperatures of over 100deg. will check and destroy the mycelium when the atmosphere is dry. In bad attacks canes and leaves are affected, reducing the vitality of the vine. Fruit in the green stages is open to attack, becoming matted with mycelium and useless. Even in milder visitations the fruit may be affected indirectly through the suffering condition of the foliage. Although oidium is the commonest disease with which we have to deal, it is not every year that conditions are conducive to its development, and as it is one which can be treated after its appearance, there is no great difficulty attached to it. Weather conditions are an indication of its possible development, and when such as those described prevail in spring it is wise to keep a look out for the first signs of trouble. Certain localities have been proved by experience to be subject to the disease, and in these it is always wise to be prepared to fight it. The common remedy, as is well known by every vigneron, consists in dusting the vines with finely powdered sulphur, which by contact with the mycelium or by the evolution of sulphur gas, irritates and destroys this vital portion of the fungus. Heat accelerates the action of the sulphur, causing a more rapid evolution of gas and a greater

irritation by contact. Hence hot weather is the best time to sulphur, and in all cases the foliage should be dry. If this is not so, the sulphur tends to gather in heaps rather than as an even dusting upon the surface. One, two, or more treatments may be necessary in persistent cases, every effort being made to check the incipient stages and prevent it extending to the fruit. The common method for applying sulphur is by medium of a mechanical bellows which delivers the sulphur as fine dust upon the vines. Other devices are adopted, such as a small hessian bag, but the former is more economical. In extreme cases horse-worked machines are used. It is interesting to note that oidium, possibly owing to climatic conditions, does not pass through the ascigerous stage of development in Australia, or, at any rate, the winter spores have not so far been isolated. The European experience was somewhat similar, and it was upwards of 50 years from the original outbreak in Europe before the winter form was isolated and identified with the *Uncinula spiralis* of America. Possibly it may be that some portion of the mycelium is perennial here, or else that the ordinary summer spore is capable of retaining its vitality from one season to another.

#### ANTHRACNOSE OR BLACK SPOT.

*Sphaceloma Ampelinum* (Viala), *Gleosporium Ampelophagum* (Massée).

This disease is typical of the *Endophytic* types, and is of particular interest just at present, because it is, or has been of late, very prevalent right throughout Australia. It is even more irregular in its appearance here than *Oidium*, hence one outbreak is forgotten before the next occurs. So far as the present prevalence of *Anthraco*se is concerned, it so happened that climatic conditions during October and November were ideal for its development in many localities, just as they were not favorable to the growth of *Oidium*. The cold, wet conditions which favored the former checked the latter. *Anthraco*se is one of the destructive fungi which must have free moisture for its progress, even though the temperature is comparatively low. Absence of free moisture upon the vegetation of the vine debars germination of the spores, and we have no sign of the disease. The continued rainy weather of October and November supplied the conditions most suited to its development, and at the same time, although atmospheric conditions were moist it was too cold for *Oidium* to grow. The spores on germination strike inwardly, and all the future development is internal. The tissues are killed in patches, resulting in dark spots and hollows, hence the vernacular name. At this stage the disease may become arrested through unfavorable weather, but if such is not the case, the wounds increase in size and often join together. The shoots become twisted and black, frequently breaking at the wounds. The whole vine becomes sickly, as the leaves are also badly affected and drop off. The fruit bunches are destroyed by attack upon the stalk or framework, while at a later stage the berries are attacked and suffer according to the severity of the infection. Summer spores are developed within the wounds, consisting of masses of spores joined together by a gummy substance. Before these spores can spread and continue the infection, they must be freed from the surrounding substance by the agency of

free water. They are then carried by the water over the vine or by other agencies to surrounding vines, renewing and spreading the disease. Winter spores form late in the season as stout pockets containing several individual spores. They are distributed over the bark and permanent portions of the vine, also upon the soil by decaying leaves, where they lie impervious to the winter rain but ready to resume so soon as conditions become satisfactory.

#### TREATMENT.

Summer treatment is practically out of the question, and therefore methods of eradication must be preventive, and they aim at the destruction of the winter spores. It is necessary to reach these spores as they rest upon the vine during the winter with solutions which will corrode and destroy the thick walls and the spores within. The remedy most generally used where this disease is prevalent consists of a mixture made with 50lbs. sulphate of iron, half a gallon of commercial sulphuric acid, and 10 gallons of boiling water. Mix the acid and sulphate of iron in a wooden or earthenware vessel, and then add the water boiling hot. Stir thoroughly, and the mixture is ready for immediate use. Owing to its corrosive effect upon metals, it is not possible to apply with any form of pump, and the mixture has to be scabbled on to the crown of the vine. The best time appears to be about a couple of weeks before the buds burst, because at that period the walls of the winter spores are beginning to soften, and are more easily destroyed. Calm, fine weather should, if possible, be chosen for the application. Another solution which is said to give good results is a 10 per cent. mixture of sulphuric acid—1gall. to 9galls. water. Subsidiary treatments may be carried out during the growing period, such as dusting the foliage with fine gypsum or powdered sulphate of iron, which, however, are merely intended to dry the leaves, and thereby prevent germination of the spores. For convenience these powders may be mixed with sulphur when treating for oidium. Possibly the application of Bordeaux or Burgundy mixtures would have a deterring effect in preventing germination of summer spores. Experience has shown during the present season that there comes a time when the disease is arrested by climatic conditions, and we find that vines which were badly affected say up to the end of December, made good healthy growth during January. The question has arisen as to the advisability of summer pruning the vines. This is a course which might well be recommended, removing and destroying affected canes and rods which have become useless. The general effect should be to throw more vigor into the young healthy wood, and give a reasonable chance of some sound canes to prune to next year. It resolves itself into a question of time and labor, but where it can be done the work has much to recommend it.

#### THE GRAPE CROP FAILURE.

Mr. Alfred Springbett read the following paper:—Most vine-growers are disappointed at the very poor setting of grapes this season. No doubt those who depend on the vines alone for their living will receive a very hard knock, as I think the crop is no more than a third of normal seasons. This, again, depends on the varieties grown, as I think I can safely say that Mataros and Doradillos are a

complete failure. Some varieties that are not so badly affected are Sweetwater (hardly noticeable), Black Portugal (slightly), and Shiraz (about half the crop). Of course, I am speaking from observations taken at our Hillside Vineyards, but I believe other vineyards in the district are similarly affected. Most of the growers are looking for a reason for the non-setting of the fruit. My opinion is that excessive moisture and cold at the time of blooming is the chief cause. Of course, some vineyards were in parts cut with frost, and later were severely beaten about with hail, which did an enormous amount of damage at Hillside, cutting branches 18in. in length back to 6in. or 9in. This gave them a big check, as they seemed to be at a standstill for a long time. Just prior to the hailstorm, there was every indication of a bumper crop, especially on the Carbinet Sauvignon and Carbinet Gross. Later, when grapes had set, they were very uneven, there being berries as large as peas, others half that size, and still flowers on the same bunch. Another thing I have noticed is that at the present time, instead of the wood being brown from the base upward for at least 12in. or 18in., as it should be, it is a pale-green color. The stems of the bunches should even be brown for at least a quarter to half an inch from the branch. I have an idea that late-pruned vines are not so badly affected. The latest-pruned vines in our own vineyard have the best crop, and that is the Grenache and also the Sherry. I mention this because in another portion of the vineyard a piece of Grenache was pruned early, and the crop was a complete failure.

#### THE DISCUSSION.

Mr. Gilbert said that he understood from Mr. Laffer that the winter spore of the oidium had not been identified, and he would like to know whether any steps had been taken in that direction. If Mr. Laffer could indicate where they might expect to find the winter spore, it would be good work.

Mr. Laffer said that had been looked into by mycologists, but they had failed. In America the winter spore had been identified as the *Uncinula spiralis*. So far as the winter spore was concerned, it was enormously difficult to attack it on the vine, nor was such necessary. The character of the mycelium laid itself open to attack in the growing period, and for that reason oidium was looked upon as one of the easiest of the pests to eradicate.

Mr. S. O. Smith (Angaston) said he would like some explanation in regard to the failure of the grape crop. Very late-growing vines had produced the best crop, and late-pruned vines had also done well. In regard to anthracnose, he would like to know whether the spore remained on the bark or the old wood of the vine.

Mr. Laffer said that it was generally understood that when the leaves were falling from the vines they distributed the spores over the whole of the crown of the vine, and, by decay, upon the surface of the soil. It was not sufficient to treat only the annual wood upon the secondary arms, because the spores would rest where there was the best lodgment, and that was in the rough bark of the older portions. In regard to the non-setting of the vines, he thought it was entirely due to the unsatisfactory weather which pre-

vailed when the flowers were on the vines. The flower of the vine was not like a rose, which when it opened exposed its reproductive organs. The part in the vine flower which represented the corolla or petals of the rose was represented by a cap, and that cap had to be pushed off before it could expose the reproductive organs underneath. The expansion of the stamens raised up the cap and threw it off. The stamens rose up and turned outwards, so that the pollen (the fertilising agent) would fall upon other flowers. Nature in that way prevented self-fertilisation. The stigma, which was the female reproductive organ, was directly under the pollen-bearing stamens, and when, from any cause, they were fertilised by the pollen of their own flowers, there was a poor setting. When the conditions were unfavorable, the pollen of the stamens was turned on to their accompanying stigma. The busting of the cap, and the turning outward of the stamens was one of Nature's provisions that self-fertilisation should not take place. But that was what had happened this year, and that was why the crop had partially failed. Looking back at the weather, they might wonder that the crop had been as good as it was. The flowers, owing to the weather, had held the cap for a fortnight or three weeks, with the result that there had been self-fertilisation, and a poor crop. The explanation of the late-pruned vines bearing well was that the late pruning threw the growth of the vine back two or three weeks, and then when the flowers came the bad weather had passed and the fruit set in the proper way. Some vines which had been cut back late, and which flowered in November, were bearing a beautiful crop.

Sir Richard Butler asked why it was that the Sweetwater crop was very good this year in his vines, and the Muscatel crop, growing close to it, was almost a failure.

Mr. Laffer said that different varieties of vines flowered at different times. The Muscatel was a notoriously bad setter at any time, and the Sweetwater, which was a good setter, flowered before the Muscatel. Probably the Sweetwater got in a day or two before the very bad weather came on. Even a day or two in weather like that was sufficient to bring about good flowering in one variety and bad in another.

Mr. Thurm (Angaston) said that oidium might be killed with sulphur, but it was useless to wait until the disease appeared on the vine. It should be applied as soon as the vine began to shoot. He had known men use hundredweights of sulphur in February, but then it was wasted. He would like to know what should be done after the disease appeared on the vines.

Mr. Laffer said he did not imply that they should let the disease get a hold of the vines before dealing with it. They should first apply sulphur before the shoots were bin. in length. Then it could be dealt with. He had seen oidium allowed to get to that stage when the vine had dense foliage, and to deal with it became an impossibility. In vineyards where it was likely to occur they should watch for it. It was readily detected in its earliest stages, and then when the weather conditions were favorable sulphur should be applied. In Europe they gave the first sulphuring when the vine was bursting,

and the second a fortnight after that. As a rule they had to sulphur at least three times, the second occasion being just about flowering time, when there was no great amount of foliage, the third about two weeks later. When the foliage was full it would be found almost an impossibility to handle it.

A delegate from Salisbury said that the question of irrigation had not been touched upon. The vines required irrigation, but he wished to know whether the class of water obtainable was suitable. The water contained a fair amount of magnesia. He was growing Grenache grapes for wine.

Mr. Laffer said that the best plan would be to submit water for analysis, in order to ascertain the exact mineral contents, and then they could judge whether it was suitable or not. Irrigation was not required for Grenache vines for wine in the Salisbury district; the natural rainfall should be sufficient.

#### FRUIT TREE AND VINE PRUNING.

Mr. F. Coleman said in regard to the question of pruning, which had been incidentally referred to, he would like to point out that the Clare Branch of the Agricultural Bureau had been conducting pruning demonstrations and competitions for some time, and they had been a great success. He thought that some of the Branches in that district should institute fruit tree pruning competitions. Excellent work of that kind had been done at McLaren Vale, but not in connection with the Agricultural Bureau. There was scope for the young members to take an active interest in the pruning of vines and fruit trees, and he thought it would be an advantage for some of the Branches to take up the work.

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#### IMPORTS AND EXPORTS OF FRUIT, PLANTS, ETC.

During the month of February, 1917, 2,457bush. of fresh fruits, 10,828bush. of bananas, 577 bags of potatoes, 10 packages of vegetables, 34 packages of plants, trees, and bulbs, and 1,207 empty wine casks, &c. were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910". 546bush. of bananas were destroyed, being overripe, and 252 wine casks, &c., were fumigated. Under the Federal Commerce Act 500 packages of dried fruit and 558 packages of preserved fruit were exported to overseas markets. These were consigned to London. Under the Federal Quarantine Act 779 packages of seeds, fruits, plants, bulbs, etc., were examined and admitted from overseas sources.

## SOME COMMON TROUBLES OF THE COW.

In the course of an address before the members of the Pompoota Branch of the Agricultural Bureau, the Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) mentioned that dairymen in that locality would be faced with a run of troubles that would crop up with great persistency, but mostly they would be of such a nature that they could be easily dealt with at the outset.

(Confining their attention to the cow as a dairy animal, they would find that the amount of milk and the duration of the milking period would be very materially affected by proper management. The cow that was not naturally a good milker might be kept in the dairy as a fairly profitable milker if properly looked after. On the other hand, if milked at irregular periods, and fed in irregular ways, she certainly would not be a profitable milker. There was no need for him to emphasise the advantages of keeping records of their cows. From his very earliest days that feature of dairying had been impressed upon him. The men who composed his audience particularly needed to know the value of their cows, and that could only eventuate through the medium of records, which entailed practically no expense, and only a few moments of the dairyman's time. He certainly concurred with those of his colleagues who preached that doctrine. It enabled the cow owner to discover whether a cow was worth keeping or not.

Essential points in connection with the cow were the methods and times of feeding, including watering, and also housing. In the latter connection nothing elaborate or expensive was needed: a straw stack would possibly suffice. They would find it necessary in these parts to thus protect their beasts against the elements in this manner for some months in the year.

### THE INFLUENCE OF TEMPERATURE.

They had experienced the early morning cold, and at such times the cow was functionally active, and required a little attention before giving her morning milk. The sudden drop of the temperature in such river districts as Pompoota had something to do with two or three common ailments they met with. It also seriously affected the regular milk flow. He knew of no domestic animal which responded more to punctuality than the cow. If she knew a regular hour for milking she would so adapt herself to give the best returns. Choice of feed was an essential factor. Too much sappy green feed, lucerne, &c., was liable to cause the best mannered cow to overdo it. If she had a chance of getting dew-wet or shower-wet lucerne, or possibly lucerne from which the river water had been drained and so forth, there was the danger of rapid fermentation in the paunch. That could be very materially checked by a systematic method of giving dry feed, somewhere about milking time. It did not matter whether before or after; both times had their merits. The combined method of lucerne feeding and syste-

matic dry feeding would considerably lessen the possibility of blowing or bloating, as it was so called, than if the cow rushed into her feed in the early morning and gulped as if she would burst. They should understand that when the cow fed in that manner it was rushed down into the paunch (which had a capacity of about 50galls.) only partially chewed. It was just sufficiently chewed to enable it to go down; the whole amount had to be rechewed as cud. He would like to lay stress upon that point. Some people seemed sceptical regarding the fact that the cow would bring up such a large amount and chew it all again. But it was true, and within the third part of 24-hours' day the whole would have been chewed as cud. She accomplished that in some sort of restful position; in the shade she would set to work and wilfully vomit up parts of the material in her paunch. That matter was very much softer than when it went down, and the effort of bringing it up causes a certain amount of juice to come into the mouth, which aids her in her work. The cow would give one or two chews on one side, and passing it over to the other, keep on chewing. She would chew it 66 times on an average before letting it down again. Mr. Place explained that that food did not go down again to the paunch, but into the third stomach, staying but a little while in the fourth, until the whole of the nutritious matter had been absorbed and the remainder released to the bowels. The speaker explained the functions of the bowels, and the method of blood supply to the liver. If the process of food digestion was interfered with or those functions impeded in their work bad results would naturally follow. They would readily recognise that the first interference with those functions would be failure to chew the cud. It would result in the whole of the process from the return of the cud to the third stomach and onwards being interfered with and retarded, and therefore one of the earliest symptoms of a cow off color was apparent in the failure of the cow to chew her cud regularly or evidencing difficulty in doing so. If, on being watched, she was found to be uneasy and made an effort to bring up the food and failed, made a stronger effort and failed again, it would then be advisable to give that cow something to open her bowels.

#### DRENCHING THE COW.

He had advised them not to drench horses, but they had no need to be so particular in respect to the cow. They should pass the left hand over the head of the cow with their fingers in her mouth, and place the bottle containing the material in her mouth, and when she began to swallow they could let the whole of it run out fast without any risk of choking her. Many drenches were given to cows too hot. What might seem the right temperature to the man may be uncomfortably hot in the mouth of the cow. The best way of determining the right heat was to pour a little of the material into one's hand, and if too hot to hold to wait until it cooled a little.

After a cow had filled herself with damp lucerne it would be found that it was rapidly being converted into gas. The animal would first begin to fill out on the left side, where four-fifths of the paunch lies. The V indentation or cavity in the left flank disappeared, and shortly afterwards the right side swelled too, and the cow generally would



begin to swell. In the ordinary way no material inconvenience would occur if it did not go any further than that stage. Having noticed that, however, they would do well to give her something to open her bowels. If they delayed and found her and some of her companions blowing up very rapidly they might soon find them with their toes turned up and resembling greatly a reversed milking stool. When that acute stage was arrived at, it was time to do something in a hurry. One of the remedies was stabbing.

#### STABBING.

There were worse things than stabbing. If they stabbed the cow they would, of course, spoil the hide, and perhaps not save the cow. Therefore if the hide was considered more valuable than the cow he would hesitate about stabbing. If, however, they thought that stabbing was going to save the cow the method of procedure was most simple. If stabbing became necessary there should be no delay; the sooner done the better. There was a special instrument for that work; it consisted simply of a wooden handle and dagger fitted in a tube, which should be inserted into the paunch. The dagger should then be pulled out and the tube left in. Where should they stab her? The answer was on the left-hand side. Why? Because the swelling on the right-hand side was pushing the small bowels into range of the proposed incision, and there would be little hope of a desirable recovery. On the left there was about 2ft. of space in which they could work with safety; it could do no harm and might do a lot of good. Putting a hand on the shoulder of the animal they should drive the instrument downwards with a turning movement in so doing. They would then move the instrument backwards and forwards, and on pulling it out there would be a rush of gas. If they held a naked light out from the cow the gas would give them 2ft. or 3ft. of blue flame. That gas represented the gas generated from carbide mixed with other inflammable gas. Having allowed all the gas to escape they would then pull out the tube and dab tar on the wound and the cow would be well again in a few days if they did not let her overfeed herself on the greenfeed again. If they did not possess a special instrument he suggested the use of a pocket knife or carving knife. An ordinary pocket knife blade would suffice if sharp enough. Having driven that pocket knife blade into the same position, and as directed in using the special instrument, they should give it a half turn and leave it in the cow. That would prevent the gas from getting in between the paunch and the skin. Giving the knife a half turn and keeping it in would keep the two holes together and thus enable the gas to escape freely. If the gas got between the skin and the paunch the cow would take a longer time to recover. Personally he would use a carving knife in preference to a dull-bladed ordinary knife. An inch cut was all that was necessary to allow the free exit of the gas. A rubber or lead tube would take the place of the tube as used in connection with the special instrument. Stabbing was a method of extreme urgency; there were half a dozen other things they would do without making a hole in the skin, but stabbing was first and foremost as a preventive measure if they had to turn their cows on to lucerne.

## OTHER METHODS.

Another method of treatment was to tar a bit of thick rope, say, 2 in., or wood of the same diameter; place the tarred rope or wood across the mouth and fasten it on to the horns with sufficiently strong string to prevent the cow from getting it out of its mouth. Her efforts to do that would cause her to slobber profusely, and the wind would be belched up with immediate relief. The mouth being kept open and the tar being obnoxious caused her to chew vigorously, and thus a large amount of saliva would be produced. Perhaps the cow would not seem bad enough for gagging in that way. Perhaps she was accustomed to blow up regularly after feeding, and if she seemed uncomfortable there were half a dozen things they could do. A dab of Stockholm tar on her nose or along her tongue was an effective method of relief in such cases. A tablespoonful of mustard would answer the same purpose, or some baking soda on the back of her tongue, or a handful of ordinary common salt. If they found these remedies were slow in acting a quicker result could be obtained by pouring into the mouth 2ozs. or 3ozs. of photographer's hyposulphite mixed with warm water and used as a drench. If hyposulphite were not available some form of ammonia would do. Baking ammonia or carbonate, say, a teaspoonful mixed with honey or molasses and put into the mouth would give quick relief. Scrubbing ammonia used in the same way would also prove effective. Burning feathers under her nose would also answer the purpose, inasmuch as they were productive of ammonia so treated. Sulphur burnt under the cow's nose would also give relief. Failing that a handful of wood ashes or charcoal (the latter ground up) and mixed with a little milk would speedily cause an absorption of the gas in the inside. With any of those methods taken in time there was every chance of saving the cow, and he urged them not to hesitate if she was blowing. If on the other hand she only became blown slightly after each meal they should give her something to keep her bowels open. For that purpose  $\frac{1}{2}$  lb. of Glauber's salts, which were sulphate of soda, or Epsom salts, dissolved in warm water, would give relief in 12 hours. If the cow was inclined to gripe they should put something warming with the salts, say, a teaspoonful or tablespoonful of ginger, some mustard, pepper, or peppermint, and the gripe would be lessened. Roughage, such as neglected lucerne, the fibrous material from the lucerne, was not easily macerated in the paunch. The purgative did not at times shift this material, and if that was the trouble they should administer nux vomica in tincture form, say, 10 to 12 drops, perhaps twice a day for a few days. With that treatment she would chew her cud more regularly, and they would see the dew on her nose and the brightness in her eye which would indicate that she was feeling decidedly better.

## DRY BIBLE.

Dealing with dry bible, Mr. Place said that if dry cows were turned out on the back country with nothing but thin stubble and a plentiful supply of sand they would naturally get considerably dry in their insides. It paid dairymen to put their dry stock on moderately good feed, and if they did that there would not be much talk of dry bible. Like most common ailments it covered a lot of conditions, and acute

indigestion undoubtedly gave the name to the disease. In that state they would find the food in the third stomach as dry as dust and as hard as slate and of that color. They would find the food had only gone a little way in and then out again, and through the bowels. There would be traces of acute indigestion, congestion, and inflammation. That was a deficiency disease, and it would be the same if they were up to their necks in stubble. Stubble might be very good when first stripped, but if left standing for some weeks it was useless. It soon became like tubes of thin blown glass. All nutriment would be bleached out by the sun and only the siliceous matter in the straw remained. Acres and acres of this class of feed would only represent starvation.

#### ANEMIA.

He came now to another class of disease—the cow form of anemia. They could discover when the animal was anemic by a bluish glaze cast across the eyes and the turning up of the whitish skin over the eye. The cloudiness was caused through poor circulation of the smaller vessels in the front of the eye which could not properly nourish it. That was aggravated with the visits of flies, such as the ordinary house fly, biting stable fly, and March fly; and, on the edge of the river farms, of mosquitoes, gnats, and so forth. A cow affected in that way would lose her normal condition and go down. Treatment at that stage was not very satisfactory. At first the cow's shoulders seemed tender in walking, and her eyes were affected. A few doses of quinine, say, a teaspoonful or from 30 to 40 grains, with molasses, or something similar given as a drench twice a day was an effective remedy. The third form of dry bible, said to be caused through eating the eggs of worms, caused weakness and loss of condition and general scouring. They would do well to give the cow first of all a purgative dose of salts, and then nux vomica and iron, and sulphate of iron was the most valuable and cheapest form in which they could give it. Half an ounce of sulphate of iron given with meals or simply with warm water once or twice a day when the cow was in that condition would soon make her better. Then came the question of differentiation of these three forms of dry bible, and the remedies to use. It was quite easy, and there was no harm in mixing all the drugs. Most cow doctoring was of the "hit and miss" variety. They could use all the drugs at once, and they would do no harm and perhaps obtain a good result. The probable doses required would be two a day, or perhaps three, for several days.

#### RED WATER.

Connected with the second form of dry bible was red water. He was given to understand they were not troubled with that in their district; higher up and lower down the Murray they were troubled with it. The symptoms reveal that the cow went off color. She ceased to chew her cud as usual, her bowels were bound up, appetite went, and she seemed uncomfortable in passing her water, which was tinged. It could be most simply described as darker than ordinarily. In a day or two it became blood-tinged, and in a few days quite red. She would grind her teeth, her eyes sunk into her head, and she went down.

At that stage it would be just as well to make a post-mortem. For treatment in the earlier stages Mr. Place recommended iron and quinine when the water was colored. In two or three days she should be well again. That form of red water was closely connected with the failure of the liver to do its work, which was the accompaniment of other forms of dry bble. They would find the gall bag contained very much more than it should, and varying from inky blackness to golden yellow. Of course they were aware it should be a greenish yellow. There would be a condition of friable liver in which a man's finger could sink into it. The kidneys were also affected. They became inflamed, dark, and full of blood.

#### MAMMITIS.

Unfortunately they would experience more than one or two cases of mammitis. For two reasons—one was through germs that the cow picked up, and that form was contagious, and the other eventuated on account of the fact that a large number of dairymen were new at the business, and possibly had gone into it with the idea of having a milking machine on four legs which only had to be placed in the bail to squirt the milk down. They should realise they were dealing with a very complex organ. The cow in its wild state produced very little milk. She might remain in milk for three or four months, but after the first month she would give very little. Such a cow was of very little use, and, therefore, they bred an animal that would give large quantities of milk for a very long time. Now that was a totally unnatural condition for the cow, but it was one necessary for her and for the dairyman and others. Mammitis in another form might be caused through an injury to the udder. Sometimes a man's boot came in contact with the udder and that caused a form of mammitis. Sudden change in the weather or the drop in the temperature in the early morning was another cause. The cow's udder was becoming functionally active at the time, and the cold had the same effect upon it as upon the fingers and toes of human beings. It caused a congested condition of the blood of the udder. It was a most common cause of the trouble.

Contagious mammitis was caused by one of those ever present germs which sometimes entered a cow's udder through the teat or dud through the cow lying on the ground. It also entered the blood which circulated through the cow's udder. They could guard against the entry of those germs into the udder by looking after the cows and keeping them clean. They should not milk the cows on to the ground but into the pail. If they did that another cow might become infected through standing and stamping in the stall, and perhaps lying down in it. When they found a quarter was bad they should not hesitate in their treatment. They would notice that the symptoms were practically the same as in other forms. The bad quarter would become hard, especially the teat, and a little knob would appear on the root of the teat. The duct would feel hard and corish in the hand; the quarter would get hot and swell; the milk would get curdly and cheesy; it would smell like high cheese, because all the germs were in the udder—they were actually cheese-making. Fermentation was going on in the milk produced in that quarter. If they experienced the trouble in a

contagious form they would find more than one cow affected with it, or showing symptoms at intervals of a few days.

Regarding the treatment, Mr. Place urged his hearers to treat every case as if possibly contagious. Contagion implied isolation. If there was a possibility of doing so they should turn the cow and her calf out from the rest and leave them to fight it out between them. One very important point in connection with isolation was that they handle her only after having finished with the other cows, and use no material that they used for the rest. He instanced a case where a dairyman had been treating and isolating the cows infected, but had been using the same material on the healthy cows. That, of course, was useless. He was really carrying out an inoculation experiment. They should not milk her on to the ground or into a bucket used for other cows, and the milk should be buried with a little lime. The germs would not survive that treatment. It should not be thrown on to the dung heap where the flies and fowls would root it up and infect the land. Elbow grease was an essential factor in the successful treatment of the cow. Hot soapsuds should be rubbed into the udder and photographer's hyposulphite given as a drench for two or three days. The soap should be shredded into hot water. That and elbow grease made a fine embrocation. The cow's udder should be rubbed perfectly dry with a braubag. If she was allowed to go out wet with the udder in that delicate condition through the rubbing she would come in worse than she went out. They should relieve the bad quarter when it seems too full of milk. They would probably have a teat syphon recommended to them. That syphon was of very little use unless for the purpose of injecting material into the udder. The idea of doing that was to kill the germs. Any antiseptic solution was suitable for that.

There were a number of things they could squirt into the udder. 1. 3 per cent. or 4 per cent. solution of boracic acid, say, 4ozs. or 5ozs., was good. A big pinch into a teacup of warm water, allowed to dissolve, injected into the udder was effective. That should be repeated on the third day, and on the third day after that. Such injections would bring the quarter back into use. Some people held that that treatment was no good. In many cases it was not. Perchloride of mercury was a most useful remedy: it was used in a very high dilution, and obtainable in tabloid form, one of which would give a strength of one in 1,000 dissolved in a pint of water, or one in 2,000 dissolved in two pints. No metal should come in contact with that drug. Glass syringe, enamel, or earthenware should be used. Half a teacupful should be injected into the udder, or a teacupful in bad cases. One or two injections of that sort would have a very beneficial effect, and they could assist that treatment by rubbing in blue ointment twice a day. Blue ointment consisted of equal parts of mercury and lard.

In cases where the quarter was absolutely rotten it was just as well to conduct a post mortem. They could, however, give the cow a good deal of relief by mixing equal parts of alcohol in the form of methylated spirits and glycerine, and rubbing the teats thoroughly with the mixture. They should also use phytolacca if procurable. Twenty drops mixed in molasses or a half a teacupful of soapsuds given three times a day would save bad cases sometime. Indications

of hopeless cases were discharge at the nose, constipation of the bowels, general weakness, and inability to rise. She should be shifted to that position in which her blood circulated properly. He believed that if the cow was not left to lie in the position in which the blood flowed into the large organs, and given a little green stuff and some hot gruel in milk, she would probably get up on her legs and be ready for treatment.

#### MILK FEVER.

Speaking of milk fever, Mr. Place said they would notice the symptoms in the cow paddling with her hind legs as if she wanted to pass water, and could not do it. In a few hours she would be off her legs, head thrown round the side, eyes closed, snoring, and looking almost dead. Years ago about 80 per cent. of the cows that went down in that way never got up again. Even now 30 per cent. survived in spite of the faulty treatment they received. A Dane formed the theory of injecting antiseptic solution into the cow's udder that would not damage the cells. That was iodide of potassium. He would strip out all the milk and inject that into the bad quarter. From 70 per cent. to 75 per cent. of his cases were a success. An Austrian found himself without iodine of potassium, and pumped in air. Following out the theory formed by the Austrian as the result of pumping air into the udder, he held that where there was prolonged difficulty in calving, milk fever was seldom seen, as that gave time for the equalisation of the blood pressure. Personally, Mr. Place advised injections without stripping. If they followed that out they should fill the udder to the distention of a cow in healthy milking condition, and prop her up on her breast. With regard to the apparatus for injecting, the teat syphon was quite sufficient. Surgical dealers would sell them milk fever outfits, and recommend them to fill the four quarters simultaneously. If it were a case of rush, a clean quill attached to a bicycle pump, and so arranged that there would be no leakage of air, would suffice. He did not recommend it in preference to the outfit, but only if the outfit were not available. In a great majority of cases injections proved a success, and in a few hours the cow would get up. Then they should treat her reasonably, giving her a little to eat. They should not overdo it. If the material used on the cow was dirty, then a form of inflammation might set up, and cause a lot of trouble.

#### QUESTIONS ANSWERED

In reply to a question, Mr. Place said old neglected lucerne was a cause of dry bible. He did not mean old healthy lucerne. It was hard to digest, and the moulds caused irritation of the paunch.

About the only certain way of diagnosing a case of sand was by the cow passing it. It was a mere matter of guesswork, however. If the cow had been on sand-producing country and small herbage, and showed signs of trouble, they could then assume it was sand. It was almost useless to attempt to shift the sand by means of purgatives, because the sand was in the paunch. The only way was to tone the cow up with vegetable, such as nux vomica, and also molasses.

Asked how to cure ordinary cow pox on the udder, Mr. Place suggested boracic acid or castor oil mixed in equal parts with ordinary oak varnish. After dressing the teats with ointment (carbolised vaseline was suitable), they would paint on.

The main symptom of colic was the cow's endeavor to relieve the pain by kicking at herself, and very often trotting around in a silly kind of way. Such behaviour would lead one to believe that there was muscular contraction of the bowels. When they noticed those indications of pain they should give the cow something to warm her inside. Ginger, mustard, or something similar could be used.

Mr. Place stated that the slipping of calves was often a contagious disease, but fortunately it could be kept well under control. There was a preventive serum that could be used with some success.

## ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on March 14th, there being present Messrs. G. R. Laffer (in the chair), A. M. Dawkins, T. H. Williams, C. J. Tuckwell, Col. Rowell, Professor Perkins, and the Acting Secretary (Mr. H. J. Finnis). Apologies were received for the absence of Messrs. F. Coleman and J. Miller.

### CONFERENCE OF DAIRY FACTORIES.

A subcommittee, consisting of Professor Perkins and Messrs. C. J. Tuckwell and A. M. Dawkins, was appointed to undertake arrangements for the Conference of Dairy Factory Representatives.

### WOMEN'S BRANCHES OF THE AGRICULTURAL BUREAU.

The following report was received from the subcommittee appointed to deal with this question:—

Your committee has met and given due consideration to the question of banding together for a common purpose women interested in agricultural matters. Your committee approves of the proposal, and whilst recognising that no locality in the State should ultimately be shut out from the benefits of the scheme, suggests that the earlier Branches should be formed in the immediate neighborhood of existing Branches of the Agricultural Bureau, and as much as possible with the concurrence and help of members of these Branches. In this connection your committee submits for your approval the following recommendations:—

1. The association of the women of South Australia interested in agricultural matters, under the auspices of the Advisory Board of Agriculture, wherever conditions permit of it.
2. The adoption of the name of Women's Branches of the Agricultural Bureau in preference to Women's Clubs.

3. The membership of Women's Branches of the Agricultural Bureau to be confined to women alone.

4. By mutual consent, and for a common purpose, joint meetings of both women's and men's Branches of the Agricultural Bureau may be held in the same locality.

5. Women's Branches of the Agricultural Bureau would be governed by the same rules as the men's Branches, and would participate in the same privileges.

6. As soon as a sufficient number of Women's Branches have been formed, it is recommended that the Minister of Agriculture be asked to direct that the columns of the *Journal of Agriculture* be thrown open to questions of domestic economy and matters in which women are specially interested.

#### NOXIOUS WEEDS LEGISLATION.

From the Conference of Lower North Branches was received a resolution to the effect that the Government should be requested to see that district councils carried out the provisions of the Noxious Weeds Act more strictly. It was decided to forward the resolution to the Minister of Agriculture, and draw attention to the previous recommendations of the Board in connection with this matter.

#### STANDARD FRUIT CASE.

The same conference also recommended that the standard fruit case regulations should be so altered as to make the provisions applicable to the metropolitan area only. The Board could not see its way to support this proposal.

#### WEST COAST TRANSPORT FACILITIES.

The conference of Upper Eyre's Peninsula Branches forwarded a resolution in support of the request of the Lower Eyre's Peninsula Branches Conference, in favor of the provision of better transport facilities between the mainland and the West Coast. This was referred to the Minister of Agriculture in support of the Board's previous recommendations.

#### WHARFAGE RATES.

The Upper Eyre's Peninsula Branches Conference urged that the Board should request the Harbors Board to give to all ports in South Australia the same rates of wharfage, and similar facilities to those ruling on the River Murray, where the wharfage rates were on every 5gall. can of milk or cream 1d., 10gall. 2d.; on every parcel of 14lbs. or under, 1d. These charges, in the case of milk and cream, covered the inward and outward dues on shipping and landing, and were met by the affixing to the package of a jetty toll stamp. It was decided to strongly recommend action in the direction suggested.

#### LIFE MEMBERSHIP.

On the recommendation of the Ramco Branch, the name of Mr. F. G. Rogers was added to the list of life members of the Agricultural Bureau.

#### NEW MEMBERS.

Forty-four names were added to the rolls of existing Branches.



## ROSEWORTHY AGRICULTURAL COLLEGE.

## SPEECH DAY.

On Friday, March 30th, the annual speech day celebrations were held at the Roseworthy Agricultural College. The chair was occupied by the Minister of Agriculture (Hon. C. Goode). After the National Anthem had been sung, the Principal of the College (Mr. W. J. Colebatch) presented his report, which was heartily approved. He said:—

## THE PRINCIPAL'S REPORT.

To-day brings to a close the thirty-second scholastic year of Roseworthy College. Since the institution was established 633 students have passed through its doors, and of these 234, or 38.39 per cent., have carried off the college diploma. These figures may be viewed with a certain degree of satisfaction, and I believe there are few public men who would deny the past students of this college the right to claim a share in the dissemination of agricultural knowledge and the institution of improved farming modes and practices throughout our State. Nevertheless, I recognise that the College would not be performing its true function were the facts otherwise. In order that it may discharge in a full measure its obligations to the community, a technical college such as this should extend its sphere of influence in an ever-widening circle through the medium of its past students, both graduates and non-graduates. Let it be clearly understood, however, that I am far from subscribing to the opinion that these young men on leaving college would be wise to regard themselves as agricultural missionaries, ordained to carry the torchlight of agricultural progress to their less fortunate brothers on the land. Whether or not they will ultimately help to improve the system of rural production in vogue in their respective districts is a matter that is less dependent upon their scientific knowledge than upon their inherent capacity to apply the education acquired here to the every-day problems of the farm.

## EDUCATION THE GREATEST NEED.

It cannot be too often impressed upon the young men as they venture forth from the college with a full store of scientific principles and a minimum of responsibility, that their greatest need is still education, and that if they are well advised, they will occupy themselves largely during the early period of their post-graduate careers in absorbing the valuable knowledge, empirical though it be, which has been hard won in the school of experience by men of riper years. It is recorded of Lord Bacon that, being interested in agriculture, he gathered together the best books of his day touching upon the subject, and when he had perused them, he ordered his servant to remove them all into the garden and burn them, for the reason that they dealt with agricultural practices instead of agricultural principles. Obviously it would simplify the question of agricultural education if it were possible to conform to the high standard set up by this famous philosopher,

but unfortunately we are still forced to admit that modern agriculture is essentially a combination of science and art. The art or practice of agriculture is an indefinite subject with innumerable ramifications, which render it unusually complex and difficult to comprehend. This phase of agriculture can only be thoroughly grasped in so far as it concerns the character of man's particular environment, and then only after many years of actual personal experience. (Hear, hear.)

#### PRINCIPLES AND PRACTICE.

It is clear, therefore, that in the brief space of an agricultural college designed for young lads between 15 and 20 years of age, there can be no room for an exhaustive course on the art of agriculture in the broadest acceptation of the term. There is, however, at this stage in the agricultural development of the State a very pressing demand for young men properly trained in the arts or practices that obtain throughout the temperate regions of the Commonwealth, as well as in agricultural science. At Roseworthy College the importance of skill in the practical operations of a farm has always been stressed hitherto, and in my view this is unquestionably the proper policy to pursue. This does not imply that the incultation of agricultural science at Roseworthy is relegated to a position of secondary importance. On the contrary, I concur with those who hold that more time might well be devoted at agricultural colleges to the study of the contributing sciences, and their relationship with agriculture. Indeed, I am keenly desirous, so soon as a favorable opportunity presents itself, of duplicating the present block of science rooms, so that the curriculum may be expanded in the direction of agricultural botany, economic mycology, agricultural zoology, economic parasitology, veterinary science, and allied subjects. This will entail a certain outlay of public money, but the attitude of public men to-day towards education is liberal, and I have therefore every confidence that when the piping days of peace return to us, and a project such as this, which aims at improving the standard of agricultural education in every important particular, will not be rejected for economic reasons. Of all the avenues of expenditure of public money, one of the last to be obstructed should be that which leads towards the development of agricultural education and rural prosperity. In this connection, I may be permitted to draw your attention to the fact that it is essential to have a knowledge of the principles underlying agricultural practices, in order to understand them and be in a position to adapt, modify, and develop them along rational lines, as circumstances may suggest.

#### THE TRAINED FARMER.

Those who are wont to indulge in crystal gazing in the hope of divining a royal road to success for the man on the land will probably be unanimous in the opinion that if the business of farming in Australia is to continue to be a prosperous avocation, it must attract to it young men who are equipped with a sound agricultural education. (Hear, hear.) Nevertheless, there is no calling in life in regard to which the need for preparatory training in study is held in such low estimation. It is frequently stated that we are living in the age of the

specialist, and yet the business of rural production, which will tax the ingenuities of the most versatile individual, is freely engaged upon by men who are wholly untutored, both in the art and the science of farming. There are approximately 40,000 men, or one-fifth of the total male population of the State, directly concerned in the raising of primary products in our State, and the number of young lads between 15 and 25 years of age, is over 25,000; and yet, notwithstanding the facilities offered by successive Governments for land settlement, the percentage of young lads above the minimum age who seek an agricultural education at Roseworthy College is less than one-tenth per cent. This is much too low for a State that is largely dependent upon agriculture, and I venture to express a hope that in the halcyon days of the future the benefits conferred by the State Agricultural College upon those who elected to take the prescribed course of instruction will become more widely known and appreciated. (Hear, hear.)

#### THE CLASSIFICATION OF CEREALS.

Turning from the general question of agricultural education to the events that have transpired at this College during the past year, I wish, in the first place, to emphasise the value of the work undertaken in connection with the collation, classification, and identification of cereals. Starting from a small nucleus of varieties, we have now close upon a thousand different named types in the cereal catalogue, and by means of botanical and agricultural characters, it is hoped to reduce this chaotic assemblage to an orderly arrangement of types, and thus dispel the general confusion of thought that enshrouds the subject of cereal varieties at the present time. This, to me, is a most useful piece of work, and it should lead ultimately to the establishment of an official Cereal Register, and a uniform system of nomenclature, both of which will simplify and facilitate the tasks of the plant breeder and cereal specialist. (Hear, hear.) The only change in the personnel of the staff during the year has resulted from war conditions. Mr. E. G. Stephens, B.Sc., the assistant chemist, has arrived in England in connection with munition laboratory work, and his place has recently been filled by the appointment of Mr. L. Hodgson. (Applause.)

#### STUDENTS AND SOLDIERS.

We are proud to recall that since the outbreak of war 150 of our old students have rallied to the colors. (Applause.) Seventeen of them are commissioned officers, and many others have qualified for similar promotion from the ranks. With so many brave fellows representing their old college amid the dangers of the battle front, we cannot hope to escape wholly from the saddening consequences of warfare, and it is one of our most painful duties to-day to record the loss of those of our lads who have paid the full cost of their whole-hearted devotion to the British Empire. The names of those who have been reported killed during the past year are L. G. Morrison, F. Inglis, F. F. Berry, J. A. B. Stevenson, and K. B. Gordon. Of those who have been through the turmoil of battle and have been spared to enjoy the rewards of their meritorious services, there are two whose deeds have won for them the coveted Military Cross. Captain J. S. Malpas,

Gold Medallist in 1909, was awarded the distinction "for conspicuous gallantry in action." A similar military decoration was won by Captain J. L. Sandford, who was a student here during 1905 and 1906. In the department of learning we take pleasure in congratulating Mr. Cyril F. Stephens on gaining the B.Sc. degree in agriculture at the Adelaide University. Mr. Stephens and also Mr. F. H. Dealy, who has almost completed his degree course in agricultural science, are also to be commended for their action in joining the Expeditionary Forces at the conclusion of their studies. (Applause.) In this connection I should mention also Mr. F. E. Watson, M.A., B.Sc., who recently returned from the Edinburgh University, and is now in the ranks of the Australian Engineers. (Applause.)

#### NEW RECORD ESTABLISHED.

Finally, we have to review the scholastic records of our present students. The young men who are leaving us to-day have passed through some strenuous times since they enrolled as students. Although we have had two extraordinary heavy harvests to cope with, and being low in man strength, the senior class of 1916-17 has been afforded exceptional opportunities of acquiring manual skill in farming operations. (Laughter.) That they have stood well up to the collar throughout is significant of an earnest desire to qualify themselves for the college diploma. Although in a sense they have experienced relatively hard times, yet they have also enjoyed certain privileges which will leave a lasting impression on their memories. I refer to the shearing trip at Concordia, and the excursion to Mount Crawford. (Applause.) Mr. Murray's generosity to Roseworthy College and its students is well known and very highly appreciated, and it is with pleasure that I received his permission to have one of his portraits hung in the College. I take this opportunity also of pointing out that we have now on the wall of this room a complete set of portraits of the former principals of this institution from its inception in 1883. The diploma results of 1916-17 have established a new record, and one for which those responsible deserve our heartiest congratulations. Their diploma average works out at 80.17 per cent., whereas the previous record is 75.72 per cent., gained in the year 1909. These results are remarkably even, less than  $2\frac{1}{2}$  per cent. separating the extremes. (Applause.) The gold medallist of the year—Mr. Frank Riggs—has earned 81.7 per cent. of the available marks, Mr. Gordon Sweeney has gained 80.12 per cent., and Mr. W. H. Lewcock 80.05 per cent. These three have thus secured first-class diplomas, and Mr. Victor O'Grady, with 79.67 per cent., and Mr. Kenneth Catt, with 79.33 per cent., have gained diplomas of the second class. (Applause.) To these young men I extend, on behalf of the College, our heartfelt wishes for their future prosperity and success. We look to them to bring yet more honor and renown to their old College by their future actions and conduct. In conclusion, I wish to proffer our sincere thanks to those who have so kindly contributed prizes and medals for competition among our students.

## THE MINISTER'S TRIBUTE.

The Minister of Agriculture, in a comprehensive address, referred eulogistically to Mr. Colebatch's capabilities and success as principal. He had heard with satisfaction the principal's opinion that any reasonable expenditure on rural education and development was fully justified. He hoped shortly to be able to announce the inauguration of a vigorous policy of agricultural expansion and land development generally.

## AGRICULTURAL EXPANSION.

It was essential that the State should be prepared to continue expenditure on the stimulation and promotion of production, in order that it might be able to overtake the huge financial burdens that were piling up. In regard to the settlement of unoccupied Crown lands, the practice of sending men out into the mallee to battle unaided against the great difficulties of pioneering must be altered. He trusted to be able to secure legislative authority to have such lands cleared in advancement of occupation—by that he meant 200 or 300 acres thoroughly and absolutely cleared, so that the new settler would then have every chance of obtaining a satisfactory crop each season, and go ahead with his operations. It was intended to continue the reclamation of the Murray swamp lands as rapidly as possession could be obtained, and go on with the irrigation of the high lands. That progressive policy must also be extended to the South-East, where there were many thousands of acres of fertile country requiring only efficient drainage to enable it to become highly productive. He looked forward to the time when stockraising would be conducted in the South-East on a much larger scale than at present. One of the greatest problems which the State had to face was represented by the recurring droughts. He urged the farmers to make provision in the good years for the lean periods. The Government had determined to set the community an example in that respect by the conservation of a national fodder reserve, which would render it possible to tide some of the more valuable stock over times of great stress. For that purpose lucerne would be grown on reclaimed swamp lands along the Murray, which, owing to their inaccessible nature, could not be settled in the ordinary way. (Applause.)

Mr. R. H. Crawford (President of the Royal Agricultural Society). Mr. G. Jeffrey (Vice-Chairman of the Advisory Board of Agriculture), Professor Perkins (Director of Agriculture), Mr. A. J. Murray, the Hon. W. Hannaford, M.L.C., and Mr. Hagne, M.P., also spoke.

## DIPLOMAS AND PRIZES.

Mrs. John Warren then distributed the trophies and prizes.

*In Order of Merit.*

Diplomas of the First Class.—Frank Riggs, with honors in agriculture, dairying, bookkeeping, aviculture, and apiculture; Gordon Sweeney, with honors in viticulture, surveying, and aviculture; William Hartley Lewcock, with honors in viticulture, fruit culture, and aviculture.

Diplomas of the Second Class.—Kenneth Clifford Catt, with honors in surveying; Victor Thomas O'Grady, with honors in bookkeeping and apiculture.

*Prize List—Third Year Students.*

Gold Medal (presented by the Royal Agricultural and Horticultural Society for the highest aggregate in all diploma subjects), Frank Riggs.

College second prize, Gordon Sweeney.

Old Students' Cup (presented by the Agricultural College Old Students' Association for the highest aggregate in agriculture and veterinary science), Frank Riggs.

Viticulture (presented by Mr. R. H. Martin), William Hartley Lewcock.

Fruit Culture (presented by Mr. George Quinn), William Hartley Lewcock.

Oenology (presented by the South Australian Vinegrowers' Association), Victor Thomas O'Grady.

Chemistry (presented by Mr. J. H. Phillips, B.Sc.), Victor Thomas O'Grady.

Veterinary Science (presented by Mr. F. E. Place, M.R.C.V.S., B.V.Sc.), William Hartley Lewcock.

Practical Examination (presented by the members of the Advisory Board of Agriculture), William Hartley Lewcock.

Outside Work (presented by the Albert Molineux Memorial Trust), Frank Riggs.

Ploughing (presented by Professor Perkins), Francis Foster Cobham.

Special Prize for Study of Farm Seeds and Grains (presented by Mr. Charles Whiting), Gordon Sweeney.

Special Prize for Surveying (presented by Mr. H. C. Pritchard), Kenneth Clifford Catt.

Special Prize for Sheep Dressing (presented by Mr. R. C. Scott), William Hartley Lewcock.

*Second Year Students.*

Silver Medal (presented by the Albert Molineux Memorial Trust), Cecil Joseph Riecnorth.

College Second Prize, Oswald Bowden.

Agriculture and Farm Diaries (presented by the Principal), Cecil Joseph Riecnorth.

Viticulture (presented by Mr. H. Buring), Cecil Joseph Riecnorth.

Fruit Culture (presented by Mr. H. E. Laffer), Cecil Joseph Riecnorth.

Veterinary Science (presented by the Principal), Cecil Joseph Riecnorth.

Agricultural Botany (presented by Mr. A. J. Adams, M.A.), John Omagh Robinson.

Outside Work (presented by the Albert Molineux Memorial Trust), John Omagh Robinson.

*First Year Students.*

Silver Medal (presented by Mr. A. L. Brunkhorst), Harry Kingsley Lewcock.

College Second Prize, Harry Ronald Haselgrove.

Agriculture and Farm Diaries (presented by the Principal), Harry Ronald Haselgrove and Harry Kingsley Lewcock (equal).

Botany (presented by Mr. A. J. Adams, M.A.), Harry Kingsley Lewcock.

Outside Work (presented by the Albert Molineux Memorial Trust), David Haynes Preston.

At the instance of Mr. Colebatch the Minister and Mrs. Warren were accorded an enthusiastic vote of thanks, after which the National Anthem was again sung. Prior to leaving the College the visitors were entertained at morning tea by the staff.

### GUMMING OF APRICOT TREES.

In a communication addressed to a fruitgrower who had sought information in reference to the gumming of young apricot trees from exposed wounds, and its relation to the time at which the pruning was done, the Horticultural Instructor (Mr. Geo. Quinn) offers some suggestions of considerable importance. "Gum" of this nature," said Mr. Quinn, "is simply sap which has been exposed and congealed or changed by contact with external agencies. Frequently, however, the change is made in stone fruits through the agency of fungi which have gained an entrance *via* wounds of a greater or lesser extent or even by means of the buds which are less able to resist than the more solid bark. The exudation *via* wounds made by pruning is increased when the pruning is performed at a time when the sap is still slightly liquid, but not actively flowing, as it is when the tree is making or sustaining foliage. One cannot say that early, medium, or late pruning after the leaves have fallen will give rise to it in any given season, for the simple reason that in our climate the solidifying of the sap is scarcely completed some years before it begins to liquefy again. In cold, dry winters the tree either goes more completely to rest, and the solidification of the sap is more complete, or the closing up of the channels at the cuts is more rapidly attained by natural processes of cauterization (drying).

"In a year like the present, the peeled-off bark, especially on young trees, even at midwinter reveals a moisture to the touch in the sap layers, and when the weather is consistently wet, so that the cut ends do not dry up, this sap is bound to exude and congeal into gum. Unless wound fungi find a lodgment on these cut ends the gum will solidify as soon as the weather turns dry and form a sort of natural plaster.

"In respect to artificial dressings to prevent injury, grafting waxes will not as a rule adhere to moist surfaces. The best suggestion I can make is to spray or paint the cuts with a strong fungicide such as Bordeaux mixture. This will disinfect the wounds and keep out decay-producing organisms until the healing tissue is drawn over the wounds by the action of the tree's growth. I may say in a general sense I believe the very prevalent decline of our apricot trees will be found to have been hastened by the heavy prunings of winter having made bad wounds which have admitted decay into the fibrous tissues of the limbs and trunks of the trees, thus lowering their vitality, although externally there is little evidence to this effect at the time. When a severe strain such as the protracted drought of recent years has imposed upon the trees' powers this lowered vitality must prove an important factor in deciding whether they shall live or die.

"I believe, if it is possible to initiate a system whereby the making of these large wounds can be avoided, and the energies of the tree in building up its permanent structure be directed into the desired channels during the growing season, much will be achieved towards increasing the tree's chances of sustaining a long life. As an indication to the practical application of this theory I suggest several summer manipulations in the form of disbudding surplus shoots, even to

complete suppression, whilst others more suitably placed have their terminal points pinched out to cause them to subdivide into growths needed for framing the tree, or maintaining a supply of fruit-bearing shoots."

### DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on April 1st:—

**BUTTER.**—The comparatively cool weather experienced during March has contributed to the production of butter being very well maintained, so that with the rains experienced the prospects of another grass season at present appear good. This State still has a surplus of second and third qualities which continue to find their way to the London market, though values there eased considerably towards the end of the month. With a shortage of tops, for which South Australia has to look to the eastern States, prices at the close of the month in prints were:—"Alfa," 1s. 6½d. per lb.; "Primus," 1s. 6d.; third grade creamery, 1s. 2½d. to 1s. 3½d.; choice separators and dairies, 1s. 4d. to 1s. 5½d.; fair quality, 1s. 2½d. to 1s. 3½d.; well-graded store and collectors', 1s. 1d. to 1s. 2½d.; off-conditioned lots, 1s. to 1s. 0½d. per lb.

**EGGS.**—The egg market, which had considerably firmed during February, eased sharply, values receding to 10½d. per dozen, but later recovered, and at the end of March hen sold at 1s.; duck, 1s. 1d. per dozen.

**CHEESE.**—Considerable quantities are still coming forward, but the market was appreciably relieved by the first shipment being made for London on behalf of the Imperial Government. Values continue to hold at 8d. to 9d. per lb. for large to loaf.

**HONEY.**—Stocks are very light, with export orders being refused; prime clear extracted selling at 4d. to 4½d. per lb.; beeswax wanted at 1s. 6d. to 1s. 7d. per lb.

**ALMONDS.**—Purchasers are eager to secure their requirements, having in view that the crop this season is only small, so that values advanced, Brantiss selling at 10½d. to 11d. per lb.; mixed softshells, 10d. to 10½d.; hardshells, 5½d.; kernels, 1s. 8d. to 1s. 9d. per lb.

**BACON.**—Supplies have considerably increased, and there is a small surplus, which is readily placed for export. Best factory-cured sides, 11d. to 1s. per lb.; hams, 1s. 1½d. to 1s. 2½d. per lb.

**LIVE POULTRY.**—To a large attendance of buyers extensive catalogues were submitted, purchasers operating freely in anticipation of Easter trade, and good competition was experienced for birds fit to kill. Certainly there were some poor conditioned sorts, but for these the prices secured were very fair considering the quality. Good table roosters fetched 3s. to 4s. each; nice conditioned cockerels, 1s. 9d. to 3s.; plump hens, 2s. to 3s.; light birds, 1s. 6d. to 2s.; ducks, 1s. 6d. to 3s. 6d.; geese, 5s. to 6s.; pigeons, 4d. to 6d. each; turkeys, from 6½d. to 10½d. per lb. live weight for fattening to good table sorts.

**POTATOES.**—Locally grown potatoes continue to be very plentiful, and according to the supplies visible at present there should be no real necessity to import from other States for some months to come. **ONIONS.**—Buyers for export have ceased to operate on this market, and as there are good supplies available, demand is lifeless, and price is stationary. Quotations—Potatoes, £4 to £5 per ton on rails Mile End or Port Adelaide. Onions, £5 10s. to £6 per ton on rails Mile End or Port Adelaide.



## THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF MARCH.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Boodabowie.*—Weather—The weather for this month has been remarkably cool. The first fortnight was bright and warm, but was followed by cloudy, dull days, with light, misty showers. The mornings have been dewy, and the weather generally unseasonable. Crops.—The reaping has been finished, and the wheat carted, although much wheat remained unreaped until well into the month. The yields have been very satisfactory, showing the wonderful quality of the soil when given suitable conditions. Natural feed is very good. The rains have not been heavy enough to cause much grass to shoot as they have farther north. Stock is generally in good condition. Colic on some farms has caused deaths amongst the horse stock. Pests—Blowflies have caused trouble amongst the sheep, and threaten to cause loss unless means to combat them are used. Mice are doing much damage. Miscellaneous—The fallows are dirty in many instances, the result of summer rains.

*Eyre's Peninsula.*—Weather has been close and thundery varied by several cool spells. Light scattered rains fell during the middle of the month, and a good steady fall was registered towards the close. In all nearly 1 in. was recorded, which is twice as much as the average for the past three seasons. This rain, combined with the rather calm conditions, was responsible for some comparatively poor scrub burns secured in the district. The soil is in nice condition for working, and farmers are commencing operations to secure as much land under crop as possible. Natural Feed—Self-sown and natural feed is plentiful, in fact in as great a supply as it has ever been known to be. Pests—Mice are exceedingly plentiful, and are doing much harm to stores of hay and seed.

*Kybybolite.*—Weather—Generally cool and fine, with three light falls of rain towards the end of the month. Crops—Summer crops have matured to much better results than expected. Kale crops are excellent. This season's crops having been heavily stocked in some instances, the second year growth on the previous season's sowing is also carrying a lot of stock. This very valuable fodder is attracting more and more attention as its use is extending among farmers. Natural Feed—The new growth is unusually forward. Stock are generally in very good order and healthy. Miscellaneous—Feed outs have been sown in some instances, and farmers are pushing on with the work preparatory to seeding.

*Turretfield.*—Weather—March was a mild month from a weather point of view. No hot weather was experienced, and there were a number of cloudy days on which rain threatened. The rainfall for the month was 122 points. Of this total 38 points were registered in the middle of the month, the remainder falling during the last two days. Crops—Lucerne did not make any rapid growth during the month, owing probably to the cool weather conditions. Natural Feed—Grass that was started by the February rains has not come on much, owing to the absence of sufficient later rains. Farmers are resorting to hand feeding to keep stock in condition. Stock—As the fallow land had to be cultivated a number of times during the season, the working horses are not in a fat condition, but farmers are now resting their horses to get them fit for seeding operations. Dairy cattle are also falling off in their milk yields, as the rain has robbed the natural feed of much of its sustenance. Pests are numerous. Mice are causing farmers much anxiety, and holders of wheat are carting their grain as fast as they can, owing to the ravages of mice in the barns. Rats are also prevalent, and a few black rats and some white mice have been noticed. Starlings are more numerous than sparrows.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of March, 1917, also the average precipitation to the end of March, and the average annual rainfall.

| Station.                   | For Mar., 1917. | To end Mar., 1917. | Average to end Mar. | Average Annual Rainfall | Station.               | For Mar., 1917. | To end Mar., 1917. | Average to end Mar. | Average Annual Rainfall |
|----------------------------|-----------------|--------------------|---------------------|-------------------------|------------------------|-----------------|--------------------|---------------------|-------------------------|
| FAR NORTH AND UPPER NORTH. |                 |                    |                     |                         | LOWER NORTH—continued. |                 |                    |                     |                         |
| Oodnadatta .....           | 0.48            | 3.28               | 1.83                | 4.76                    | Gulnare .....          | 1.63            | 4.11               | 2.12                | 19.74                   |
| Tarcoola .....             | 0.40            | 4.19               | 1.35                | 7.58                    | Bundaleer W.Wks. ....  | 1.32            | 3.23               | 2.02                | 17.29                   |
| Hergott .....              | 0.8             | 2.44               | 1.47                | 6.04                    | Yacka .....            | 1.41            | 3.62               | 1.77                | 19.27                   |
| Farina .....               | 0.8             | 2.95               | 1.78                | 6.70                    | Koolunga .....         | 1.50            | 4.53               | 1.99                | 15.94                   |
| Leigh's Creek .....        | 0.27            | 4.86               | 1.06                | 8.66                    | Snowtown .....         | 1.06            | 3.80               | 1.85                | 15.70                   |
| Beltana .....              | 0.32            | 5.48               | 2.28                | 9.22                    | Brinkworth .....       | 1.87            | 4.23               | 1.94                | 15.48                   |
| Blinman .....              | 0.26            | 3.94               | 2.77                | 12.83                   | Rlyth .....            | 1.36            | 3.65               | 2.01                | 16.34                   |
| Hookina .....              | 1.22            | 8.03               | —                   | —                       | Clare .....            | 2.22            | 5.11               | 2.77                | 24.30                   |
| Hawker .....               | 0.88            | 7.65               | 1.65                | 12.22                   | Minero Central .....   | 2.07            | 5.16               | 2.20                | 21.99                   |
| Wilson .....               | 0.79            | 5.26               | 1.83                | 11.78                   | Watervale .....        | 2.20            | 5.75               | 2.81                | 27.17                   |
| Gordon .....               | 0.65            | 7.57               | 1.79                | 10.26                   | Auburn .....           | 1.83            | 5.15               | 3.02                | 24.25                   |
| Quorn .....                | 0.86            | 4.97               | 1.70                | 13.78                   | Hoyleton .....         | 1.19            | 3.97               | 2.19                | 17.06                   |
| Port Augusta .....         | 0.70            | 3.18               | 1.75                | 9.46                    | Balaklava .....        | 1.04            | 3.50               | 2.02                | 16.03                   |
| Port Augusta W. ....       | 0.85            | 3.50               | 1.45                | 9.36                    | Port Wakefield .....   | 0.83            | 4.62               | 2.16                | 13.13                   |
| Bruce .....                | 0.85            | 4.70               | 1.71                | 10.01                   | Terowie .....          | 0.65            | 5.04               | 2.10                | 15.71                   |
| Hammond .....              | 1.48            | 7.33               | 1.82                | 11.46                   | Yarowie .....          | 0.87            | 5.71               | 2.06                | 13.91                   |
| Wilmington .....           | 1.00            | 4.99               | 2.16                | 18.26                   | Hallett .....          | 0.82            | 2.94               | 1.97                | 16.40                   |
| Willowie .....             | 0.87            | 6.00               | 1.90                | 11.90                   | Mount Bryan .....      | 0.97            | 2.98               | 1.92                | 15.73                   |
| Melrose .....              | 1.69            | 6.52               | 3.20                | 23.04                   | Burra .....            | 0.86            | 2.51               | 2.30                | 17.82                   |
| Booderoo Centre .....      | 1.18            | 5.85               | 1.99                | 15.83                   | Farrell's Flat .....   | 1.21            | 2.58               | 2.26                | 18.87                   |
| Port Germein .....         | 1.16            | 4.05               | 1.82                | 12.84                   | WEST OF MURRAY RANGE.  |                 |                    |                     |                         |
| Wirrabara .....            | 1.71            | 5.39               | 2.24                | 18.91                   | Manoora .....          | 1.19            | 3.86               | 2.17                | 18.19                   |
| Appila .....               | 1.33            | 5.20               | 2.24                | 15.08                   | Saddleworth .....      | 1.07            | 3.55               | 2.52                | 19.69                   |
| Cradock .....              | 0.57            | 6.14               | 1.77                | 10.86                   | Marrabel .....         | 1.05            | 3.11               | 2.14                | 18.94                   |
| Carrieton .....            | 0.80            | 7.10               | 1.78                | 12.22                   | Riverton .....         | 1.48            | 5.20               | 2.47                | 20.48                   |
| Johnburg .....             | 0.41            | 5.68               | 1.49                | 10.21                   | Tarlee .....           | 1.17            | 3.39               | 2.23                | 17.48                   |
| Eurelia .....              | 0.68            | 6.95               | 1.90                | 13.24                   | Stockport .....        | 1.25            | 2.79               | 2.07                | 15.89                   |
| Orroroo .....              | 0.50            | 6.47               | 2.27                | 13.42                   | Hamley Bridge .....    | 1.09            | 3.00               | 2.19                | 16.45                   |
| Black Rock .....           | 0.46            | 6.22               | 1.99                | 12.25                   | Kapunda .....          | 1.17            | 2.92               | 2.53                | 19.67                   |
| Petersburg .....           | 0.51            | 6.94               | 2.04                | 13.07                   | Freeling .....         | 1.03            | 2.63               | 2.23                | 17.85                   |
| Yongala .....              | 0.85            | 6.67               | 1.87                | 13.94                   | Greenock .....         | 1.39            | 3.27               | 2.37                | 21.46                   |
| NORTH EAST.                |                 |                    |                     |                         | Truro .....            | 1.23            | 3.27               | 2.21                | 19.74                   |
| Ucolta .....               | 0.41            | 6.14               | —                   | —                       | Stockwell .....        | 1.13            | 3.15               | 2.23                | 20.30                   |
| Nackara .....              | 0.48            | 6.95               | —                   | —                       | Nuriootpa .....        | 1.03            | 2.82               | 2.34                | 21.25                   |
| Yunta .....                | 0.41            | 6.58               | 1.72                | 8.22                    | Angaston .....         | 1.37            | 3.43               | 2.36                | 22.25                   |
| Waukarina .....            | 0.82            | 5.74               | 1.59                | 7.94                    | Tanunda .....          | 1.15            | 2.92               | 2.58                | 22.28                   |
| Mannahill .....            | 0.38            | 4.38               | 1.75                | 8.46                    | Lyndoch .....          | 1.40            | 3.32               | 2.25                | 23.01                   |
| Cockburn .....             | 0.23            | 6.12               | 1.80                | 7.97                    | Williamstown .....     | 1.59            | —                  | —                   | —                       |
| Broken Hill, NSW .....     | 0.58            | 7.34               | 2.23                | 9.63                    | ADELAIDE PLAINS.       |                 |                    |                     |                         |
| LOWER NORTH.               |                 |                    |                     |                         | Mallala .....          | 1.11            | 3.38               | 2.11                | 16.88                   |
| Port Pirie .....           | 1.84            | 4.90               | 1.86                | 13.21                   | Roseworthy .....       | 1.08            | 3.25               | 2.14                | 17.31                   |
| Port Broughton .....       | 1.14            | 2.85               | 1.85                | 14.33                   | Gawler .....           | 1.28            | 4.01               | 2.36                | 19.21                   |
| Bute .....                 | 1.14            | 3.58               | 1.79                | 15.42                   | Two Wells .....        | 1.07            | 3.08               | 2.05                | 16.36                   |
| Laura .....                | 1.47            | 4.64               | 2.20                | 18.22                   | Virginia .....         | 1.62            | 4.03               | 2.19                | 17.38                   |
| Caltowie .....             | 1.74            | 4.28               | 2.17                | 17.27                   | Smithfield .....       | 1.34            | 4.25               | 2.25                | 17.90                   |
| Jamestown .....            | 1.66            | 4.25               | 2.15                | 17.46                   | Salisbury .....        | 1.71            | 4.41               | 2.35                | 18.67                   |
| Gladstone .....            | 1.49            | 4.40               | 1.94                | 16.00                   | North Adelaide .....   | 3.25            | 6.51               | 3.47                | 21.49                   |
| Crystal Brook .....        | 2.11            | 4.07               | 1.89                | 15.62                   | Adelaide .....         | 2.50            | 5.34               | 3.30                | 21.64                   |
| Georgetown .....           | 1.65            | 4.98               | 2.24                | 18.32                   | Brighton .....         | 2.59            | 6.09               | 2.47                | —                       |
| Narridy .....              | 2.45            | 4.41               | 2.05                | 16.79                   | Glenelg .....          | 1.99            | 5.18               | 2.26                | —                       |
| Redhill .....              | 1.58            | 4.34               | 2.90                | 16.79                   | Magill .....           | 2.95            | 6.06               | 2.85                | 19.93                   |
| Spalding .....             | 1.33            | 3.18               | 2.36                | 20.25                   | Glen Osmond .....      | 3.11            | 8.39               | 2.63                | 25.26                   |
|                            |                 |                    |                     |                         | Mitcham .....          | 3.07            | 6.03               | 2.42                | 23.47                   |
|                            |                 |                    |                     |                         | Belair .....           | 3.27            | 6.54               | 3.00                | 28.84                   |

# RAINFALL—continued.

| Station.                 | For Mar. 1917. | To end Mar. | A'ge. to end Mar. | A'ge. Annual Rainfall. | Station.                         | For Mar. 1917. | To end Mar. | A'ge. to end Mar. | A'ge. Annual Rainfall. |
|--------------------------|----------------|-------------|-------------------|------------------------|----------------------------------|----------------|-------------|-------------------|------------------------|
| MOUNT LOFTY RANGES.      |                |             |                   |                        | WEST OF SPEKKE'S GULF—continued. |                |             |                   |                        |
| Teetree Gully....        | 2.34           | 5.06        | 3.23              | 28.19                  | Port Lincoln ....                | 1.29           | 3.64        | 2.06              | 19.88                  |
| Stirling West ...        | 5.18           | 9.34        | 4.46              | 46.70                  | Tunby Bay ....                   | 1.11           | 3.62        | 1.50              | 15.00                  |
| Usaidla .....            | 4.81           | 8.46        | 4.44              | 44.35                  | Carrow .....                     | 1.45           | 5.85        | —                 | —                      |
| Clarendon .....          | 3.25           | 6.98        | 3.52              | 33.67                  | Arno Bay .....                   | 1.55           | 3.74        | —                 | —                      |
| Morphett Vale ...        | 1.96           | 5.28        | 2.66              | 23.32                  | Cowell .....                     | 1.00           | 3.85        | 1.75              | 11.76                  |
| Noorhunga .....          | 1.79           | 5.80        | 2.26              | 20.28                  | Point Lowly....                  | 0.67           | 4.17        | 2.01              | 12.21                  |
| Willinga .....           | 2.04           | 6.38        | 2.74              | 25.98                  | Hammock Hill ..                  | 0.69           | 4.91        | —                 | —                      |
| Aldinga .....            | 1.80           | 6.21        | 2.36              | 20.34                  |                                  |                |             |                   |                        |
| Myponga .....            | 1.74           | 6.61        | —                 | —                      | YORKE'S PENINSULA.               |                |             |                   |                        |
| Normanville .....        | 1.13           | 5.20        | 2.13              | 20.65                  | Wallaroo.....                    | 0.93           | 2.94        | 1.83              | 14.05                  |
| Yankalilla .....         | 1.26           | 5.64        | 2.50              | 22.78                  | Kadina.....                      | 1.16           | 2.95        | 1.84              | 15.88                  |
| Cape Jervis .....        | 0.86           | 3.90        | 1.02              | 16.34                  | Moonta .....                     | 1.40           | 4.21        | 1.84              | 15.22                  |
| Mount Pleasant ..        | 1.62           | 3.77        | 2.70              | 26.87                  | Green's Plains ..                | 1.02           | 3.20        | 1.69              | 15.73                  |
| Blumberg .....           | 2.18           | 4.79        | 3.00              | 29.38                  | Maitland .....                   | 1.50           | 4.75        | 2.04              | 20.08                  |
| Gomeracha .....          | 2.43           | 6.14        | 3.21              | 33.30                  | Ardrossan .....                  | 1.01           | 3.33        | 1.65              | 13.89                  |
| Millbrook Reservr.       | 2.83           | 5.68        | —                 | —                      | Port Victoria ..                 | 1.50           | 4.92        | 1.60              | 15.21                  |
| Lothelal .....           | 2.86           | 5.45        | 3.13              | 35.38                  | Curramulka .....                 | 1.87           | 3.96        | 2.02              | 18.50                  |
| Woodside .....           | 3.25           | 5.99        | 3.08              | 31.87                  | Minlaton .....                   | 2.46           | 5.25        | 1.75              | 17.41                  |
| Hahndorf .....           | 3.21           | 5.19        | 3.35              | 35.46                  | Stanbury .....                   | 2.08           | 5.91        | 1.86              | 17.06                  |
| Nairne .....             | 2.74           | 5.29        | 3.33              | 28.83                  | Warooka .....                    | 1.43           | 5.91        | 1.59              | 17.71                  |
| Mount Barker .....       | 3.79           | 6.70        | 3.31              | 30.93                  | Yorktown .....                   | 1.08           | 4.55        | 1.66              | 17.47                  |
| Echunga .....            | 3.79           | 6.64        | 3.42              | 32.83                  | Edithburgh .....                 | 1.15           | 4.42        | 1.87              | 16.48                  |
| Maclefield .....         | 2.95           | 5.74        | 3.15              | 30.72                  | Port Vincent .....               | 1.44           | 5.32        | —                 | —                      |
| Meadows .....            | 3.44           | 6.48        | 3.74              | 35.52                  |                                  |                |             |                   |                        |
| Strathalbyn .....        | 1.79           | 3.69        | 2.48              | 19.28                  | SOUTH AND SOUTH-EAST.            |                |             |                   |                        |
| MURRAY FLATS AND VALLEY. |                |             |                   |                        | Cape Borda .....                 | 1.15           | 2.97        | 2.19              | 25.09                  |
| Wellington .....         | 1.44           | 2.98        | 2.24              | 15.01                  | Kingscote .....                  | 1.06           | 5.22        | 1.77              | 18.95                  |
| Milang .....             | 0.86           | 2.42        | 2.12              | 16.08                  | Penneshaw .....                  | 0.76           | 3.65        | 2.23              | 21.34                  |
| Langhorne's Brdg         | 1.13           | 2.79        | 2.07              | 15.27                  | Cape Willoughby..                | 1.24           | 3.36        | 2.16              | 19.69                  |
| Tailm Bend .....         | 1.57           | 4.53        | —                 | —                      | Victor Harbor ..                 | 1.61           | 5.30        | 2.56              | 22.18                  |
| Murray Bridge ..         | 1.21           | 2.58        | 2.15              | 14.32                  | Port Elliot .....                | 1.34           | 4.70        | 2.45              | 20.33                  |
| Callington .....         | 1.62           | 3.49        | 2.22              | 15.65                  | Goolwa .....                     | 1.37           | 4.14        | 2.33              | 17.93                  |
| Neamum .....             | 0.62           | 2.07        | 1.86              | 11.67                  | Pinnaroo .....                   | 0.53           | 2.15        | 2.59              | 16.71                  |
| Palmer .....             | 0.45           | 1.99        | 2.23              | 15.60                  | Parilla .....                    | 0.51           | 2.09        | —                 | —                      |
| Sedao .....              | 0.38           | 3.41        | 1.62              | 11.92                  | Lameroo .....                    | 0.55           | 2.06        | 2.09              | 16.65                  |
| Swan Reach .....         | 0.42           | 2.29        | —                 | —                      | Parrakie .....                   | 0.92           | 2.49        | —                 | —                      |
| Blanchetown .....        | 0.30           | 0.97        | 1.94              | —                      | Geranium .....                   | 1.45           | 2.79        | —                 | —                      |
| Eodonda .....            | 0.67           | 2.14        | 2.16              | 10.71                  | Peake .....                      | 1.31           | 3.36        | —                 | —                      |
| Sutherlands .....        | 0.39           | 1.50        | 1.40              | 17.33                  | Cooke's Plains ..                | 1.74           | 4.43        | 2.06              | 14.74                  |
| Morgan .....             | 0.49           | 1.46        | 1.51              | 10.60                  | Meningie .....                   | 1.42           | 4.27        | 2.20              | —                      |
| Waikerie .....           | —              | 2.55        | —                 | 9.29                   | Coomandook .....                 | 1.70           | 3.94        | 0.71              | 17.49                  |
| Overland Corner ..       | 0.38           | 3.35        | 2.02              | 11.42                  | Coomalpyne .....                 | 1.58           | 3.96        | 2.07              | 16.80                  |
| Renmark .....            | 0.26           | 4.66        | 1.81              | 10.93                  | Tintinara .....                  | 1.46           | 3.28        | 2.31              | 18.78                  |
| Loxton .....             | 0.44           | 6.08        | —                 | —                      | Keith .....                      | 1.41           | 3.95        | —                 | —                      |
| WEST OF SPEKKE'S GULF.   |                |             |                   |                        | Bordertown .....                 | 1.28           | 4.34        | 2.17              | 19.76                  |
| Eucalyptus .....         | 1.32           | 2.07        | 2.16              | 10.13                  | Wolsley .....                    | 1.28           | 3.03        | 1.96              | 17.72                  |
| White Well .....         | 0.85           | 2.46        | 1.58              | 9.67                   | Frances .....                    | 0.94           | 3.32        | 2.32              | 20.74                  |
| Fowler's Bay .....       | 0.91           | 2.23        | 1.32              | 12.11                  | Naracoorte .....                 | 1.53           | 2.69        | 2.56              | 22.80                  |
| Penong .....             | 0.94           | 2.46        | 1.39              | 11.93                  | Penola .....                     | 1.85           | 3.98        | 3.24              | 26.78                  |
| Murat Bay .....          | 1.14           | 2.86        | —                 | —                      | Lucindale .....                  | 1.05           | 2.56        | 2.46              | 23.32                  |
| Smoky Bay .....          | 0.90           | 2.16        | —                 | —                      | Kingston .....                   | 0.87           | 2.87        | 2.45              | 24.73                  |
| Petina .....             | 0.56           | 2.38        | —                 | —                      | Robe .....                       | 0.86           | 2.88        | 2.53              | 24.69                  |
| Straky Bay .....         | 0.62           | 2.49        | 1.54              | 16.31                  | Beachport .....                  | 1.35           | 3.95        | 3.02              | 27.51                  |
| Tala .....               | 1.15           | 3.67        | —                 | —                      | Millipont .....                  | 1.70           | 3.06        | 33.1              | 29.25                  |
| Port Elliston .....      | 1.58           | 3.20        | 1.39              | 16.49                  | Kalangadoo .....                 | 2.09           | 4.28        | —                 | 32.00                  |
| Cummins .....            | 1.10           | 3.28        | —                 | —                      | Mount Gambier ..                 | 1.69           | 3.79        | 4.04              | 26.63                  |
|                          |                |             |                   |                        | C. Northumberland                | 1.43           | 2.72        | 3.02              | 18.87                  |

## AGRICULTURAL BUREAU REPORTS.

## INDEX TO CURRENT ISSUE AND DATES OF MEETINGS.

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|                           |                | Apr.               | May. |                          |                | Apr.               | May. |
| Amyton .....              | *              | —                  | —    | Forster .....            | *              | —                  | —    |
| Angaston .....            | *              | —                  | —    | Frances .....            | *              | —                  | —    |
| Appila-Yarrowie .....     | *              | —                  | —    | Freeling .....           | †              | 5                  | 3    |
| Arden Vale & Wyacca ..... | *              | —                  | —    | Gawler River .....       | †              | —                  | 7    |
| Arthurton .....           | *              | —                  | —    | Georgetown .....         | *              | —                  | —    |
| Balaklava .....           | *              | 11                 | —    | Geranium .....           | 760            | 26                 | 26   |
| Beaufort .....            | *              | —                  | —    | Gladstone .....          | *              | —                  | —    |
| Beetaloo Valley .....     | *              | —                  | —    | Glencoe .....            | *              | —                  | —    |
| Belalie North .....       | *              | —                  | —    | Glencope .....           | *              | —                  | —    |
| Berri .....               | 760            | 4                  | 9    | Goode .....              | *              | —                  | —    |
| Blackheath .....          | 760            | 7                  | 5    | Green Patch .....        | †              | —                  | —    |
| Blackwood .....           | *              | 16                 | 21   | Gumeracha .....          | *              | —                  | —    |
| Blyth .....               | *              | 14                 | 12   | Halidon .....            | *              | —                  | —    |
| Bookpurnong East .....    | *              | —                  | —    | Hartley .....            | *              | 4                  | 2    |
| Booderoo Centre .....     | *              | 6                  | 4    | Hawker .....             | *              | 10                 | 8    |
| Borrika .....             | *              | —                  | —    | Hilltown .....           | *              | —                  | —    |
| Bowhill .....             | *              | —                  | —    | Hookina .....            | *              | 3                  | 1    |
| Brentwood .....           | *              | 5                  | 3    | Inman Valley .....       | 761            | 5                  | 3    |
| Brinkley .....            | *              | —                  | —    | Ironbank .....           | *              | —                  | —    |
| Bundaleer Springs .....   | *              | —                  | —    | Julia .....              | *              | —                  | —    |
| Burra .....               | *              | —                  | —    | Kadina .....             | *              | —                  | —    |
| Bute .....                | *              | —                  | —    | Kalangadoo .....         | †              | 14                 | 12   |
| Butler .....              | †              | —                  | —    | Kanmantoo .....          | *              | 7                  | 5    |
| Caltowie .....            | *              | —                  | —    | Keith .....              | *              | —                  | —    |
| Canowie Belt .....        | *              | —                  | —    | Ki Ki .....              | *              | —                  | —    |
| Carrieton .....           | *              | —                  | —    | Kingscote .....          | *              | —                  | —    |
| Carrow .....              | *              | —                  | —    | Kingston-on-Murray ..... | *              | —                  | —    |
| Cherry Gardens .....      | †              | 3                  | 1    | Kongorong .....          | 765            | 3                  | 1    |
| Clanfield .....           | *              | —                  | —    | Koonibba .....           | 758            | 3                  | 1    |
| Clare .....               | *              | —                  | —    | Koppio .....             | 758            | —                  | —    |
| Clarendon .....           | *              | 2                  | 7    | Kybybolite .....         | 765            | 5                  | 3    |
| Claypan Bore .....        | *              | —                  | —    | Lameroo .....            | *              | —                  | —    |
| Colton .....              | *              | —                  | —    | Laura .....              | *              | —                  | —    |
| Coomandook .....          | *              | —                  | —    | Leighton .....           | *              | —                  | —    |
| Coomooroo .....           | *              | —                  | —    | Lone Pine .....          | 750-7          | 3                  | 1    |
| Coonalpyn .....           | 760            | —                  | —    | Longwood .....           | *              | —                  | —    |
| Coonsawarra .....         | *              | —                  | —    | Luxton .....             | *              | —                  | —    |
| Coorabie .....            | *              | —                  | —    | Lucindale .....          | *              | —                  | —    |
| Cradock .....             | *              | —                  | —    | Lyndoch .....            | †              | —                  | —    |
| Crystal Brook .....       | 750            | —                  | —    | MacGillivray .....       | †              | —                  | —    |
| Cumnine .....             | *              | 7                  | 5    | Maitland .....           | *              | —                  | —    |
| Cyngnet River .....       | †              | 5                  | 3    | Mallala .....            | *              | 9                  | 14   |
| Daveport .....            | *              | —                  | —    | Mangalo .....            | *              | —                  | —    |
| Dawson .....              | *              | —                  | —    | Mantung .....            | *              | —                  | —    |
| Denial Bay .....          | *              | —                  | —    | Meadows South .....      | *              | 3                  | 1    |
| Dowlingville .....        | *              | —                  | —    | Meningie .....           | *              | —                  | —    |
| Edillilie .....           | *              | —                  | —    | Milang .....             | 761-2          | —                  | —    |
| Elbow Hill .....          | *              | —                  | —    | Millicent .....          | *              | 10                 | 8    |
| Eurelia .....             | *              | —                  | —    | Miltalie .....           | *              | 7                  | 5    |
| Forest Range .....        | *              | —                  | —    | Mindarie .....           | *              | 2                  | —    |

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| Minlaton .....        | *              | 6                  | 4         | Port Pirie .....      | *              | 7                  | 5    |
| Minipa .....          | *              | 7                  | 5         | Quora .....           | *              | 7                  | 5    |
| Mintaro .....         | †              | 7                  | 5         | Remo .....            | 759            | 2                  | 7    |
| Mit-hell .....        | *              | —                  | —         | Rochill .....         | *              | 3                  | 1    |
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| Moonta .....          | *              | —                  | —         | Roberts and Verran .. | *              | —                  | —    |
| Moorlands .....       | *              | —                  | —         | Rosenthal .....       | *              | —                  | 2    |
| Morehard .....        | †              | 7                  | 5         | Roar Pine .....       | *              | —                  | —    |
| Morgan .....          | †              | —                  | —         | Saddieworth .....     | *              | —                  | —    |
| Morphett Vale .....   | †              | —                  | —         | Salisbury .....       | 751-7          | —                  | —    |
| Mount Barker .....    | †              | 4                  | 2         | Salt Creek .....      | 757            | —                  | —    |
| Mount Bryan .....     | †              | —                  | —         | Sandalwood .....      | *              | —                  | —    |
| Mount Bryan East ..   | †              | —                  | —         | Sherlock .....        | *              | —                  | —    |
| Mount Compass .....   | 765            | —                  | —         | Spalding .....        | *              | —                  | —    |
| Mount Gambier .....   | †              | —                  | —         | Stirling's Well ..... | *              | —                  | —    |
| Mount Hope .....      | *              | —                  | —         | Stockport .....       | *              | —                  | 1    |
| Mount Pleasant .....  | *              | —                  | —         | Strathalbyn .....     | 763            | 3                  | 1    |
| Mount Remarkable ..   | 748            | —                  | —         | Sutherland .....      | *              | —                  | —    |
| Mundalla .....        | 766            | 11                 | 9         | Tantanoola .....      | *              | 7                  | 5    |
| Mundoorra .....       | *              | —                  | —         | Tarcowie .....        | *              | 3                  | 1    |
| Murray Bridge .....   | *              | 2                  | 7         | Tatara .....          | *              | 7                  | 5    |
| Myponga .....         | 760            | 4                  | 2         | Tintinnara .....      | *              | —                  | —    |
| Myponga .....         | *              | —                  | —         | Two Wells .....       | 757            | —                  | —    |
| Myrta .....           | *              | —                  | —         | Craidda and Summert'n | 764            | 2                  | 7    |
| McNamara Pore .....   | *              | —                  | —         | Waikerie .....        | *              | 7                  | 4    |
| Nantawarra .....      | *              | —                  | —         | Warcowie .....        | *              | —                  | —    |
| Naracoorte .....      | *              | —                  | —         | Warrow .....          | *              | —                  | —    |
| Narriady .....        | *              | —                  | —         | Watervale .....       | *              | —                  | —    |
| Narrung .....         | 762            | —                  | —         | Wepowie .....         | 748            | 7                  | 5    |
| Netherton .....       | *              | —                  | —         | Whyte-Yarcowie .....  | 750            | —                  | —    |
| North Booborowie ..   | *              | —                  | —         | Wilkawatt .....       | *              | —                  | —    |
| North Bundaleer ..... | *              | —                  | —         | Willowie .....        | *              | 3                  | 1    |
| Northfield .....      | *              | 3                  | 1         | Wilmington .....      | 748            | —                  | —    |
| Orroroo .....         | *              | —                  | —         | Wirrabara .....       | 748            | —                  | —    |
| Parilla .....         | *              | 5                  | 3         | Wirrega .....         | *              | —                  | —    |
| Parilla Well .....    | *              | —                  | —         | Wollowa .....         | *              | —                  | —    |
| Parakie .....         | *              | 7                  | —         | Woodleigh .....       | †              | —                  | —    |
| Paskeville .....      | *              | —                  | —         | Woodside .....        | *              | —                  | —    |
| Penola .....          | *              | —                  | —         | Wynarka .....         | †              | —                  | —    |
| Penong .....          | *              | 14                 | 12        | Yabmana .....         | *              | —                  | —    |
| Petina .....          | *              | —                  | —         | Yacka .....           | *              | —                  | —    |
| Pine Forest .....     | *              | —                  | —         | Yadnaris .....        | 757            | —                  | —    |
| Pinnaroo .....        | *              | —                  | —         | Yallunda .....        | 758            | —                  | 5    |
| Pompana .....         | *              | —                  | —         | Yambee .....          | *              | —                  | —    |
| Port Broughton .....  | *              | 4-18               | 2, 16, 30 | Yeeleana .....        | 758            | —                  | —    |
| Port Elliot .....     | 763            | 21                 | 19        | Yongala Vale .....    | *              | 2                  | 7    |
| Port Germain .....    | *              | —                  | —         | Yorktown .....        | *              | —                  | —    |

\* No report received during the month of March.

† Formal report only received.

† Held over until next month.

## ADVISORY BOARD OF AGRICULTURE.

Date of Meeting—May 9th, 1917.

## THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

### REPORTS OF BUREAU MEETINGS.

#### UPPER-NORTH DISTRICT.

##### (PETERSBURG AND NORTHWARD.)

MOUNT REMARKABLE, January 13th.—Mr. W. Foot produced samples of Lott's, Dart's Imperial, and Marshall's No. 3 wheats. The best head was selected from each variety, and the grains counted as follows:—Lott's 63, Dart's Imperial 69, Marshall's No. 3 74. When weighed the 63 of Lott's were equal to the 74 of Marshall's No. 3. On December 6th Mr. N. S. Giles, B.Sc., produced samples from his farm, and the number of grains from three heads of each variety was as follows:—Lott's 310, Federation 217, Bunyip 212, Yandilla King 210, Comeback 207, and Cumberland 205. The weights were not taken.

MOUNT REMARKABLE, February 28th.—Discussion took place as to the relative merits of various farming implements. The opinion was generally voiced that although the harvester in a crop which stood up well saved nearly as much grain as the reaper and thrasher, yet the cutting device of the latter stamped it as the better machine in the tangled and frequently rotten straw of the present season's crops. In any case it was held that cutting saved more grain than beating. The divider and the roller were the parts which helped to give pre-eminence to the reaper and thrasher. Samples of Federation, Yandilla King, and Bunyip grain were submitted by Mr. H. E. Challenger, who stated that Federation on the heavy ground stood up better and showed finer grain than the same wheat on looser ground. It was sown earlier, and showed less straw than the others. In regard to weight of grain, 100 grains of Federation were equal in weight to only 84 grains of Yandilla King, and only 66 grains of Bunyip, both reaped before the rain. Of Federation 97 grains reaped before the rain weighed the same as 100 grains reaped after the rain.

WEPOWIE, March 3rd.—Discussion took place as to the merits of different methods of harvesting, the general opinion being that the reaper and thrasher were the best for saving labor.

WILMINGTON, March 7th.—Mr. A. J. G. Benier read a paper on the mismanagement of the farm, in which he detailed a number of shortcomings in management to which farmers were prone. He recommended that every farmer should carry a notelook, in which to jot down the things which required to be done, and the ideas which suggested themselves to an intelligent and observant man in moving about the farm, but which were often lost through lack of memory.

#### MIDDLE-NORTH DISTRICT.

##### (PETERSBURG TO FARRELL'S FLAT.)

##### WIRABARA (Average annual rainfall, 18.9in.).

February 3rd.—Present: 13 members.

COLIC IN HORSES.—A paper was read by Mr. P. J. Curnow on colic in horses, in the course of which he said that one of the most common diseases of the horse was colic or gripes. Owing to its acute form it required prompt diagnosis and treatment. Before dealing with the subject in a general way, he would first consider that part of the horse's anatomy which became affected. The stomach and intestines, that was the digestive apparatus generally, was furnished with three

coats. The outer coat was composed of a series of membranes (a shining lubricating substance), which prevented the parts from sticking to each other or to the walls or the cavity of the abdomen. The second or middle coat was muscular. The third or inner lining was composed of mucous membrane. That great mass of blood vessels which fed the stomach was situated on the surface of the muscular coat, immediately under the inner lining membrane. All those diseases such as colic or gripes, intusussception, or the entanglement of one gut with another, peritonitis, or inflammation of the mucous membrane, and other such affections, though they were known by many names, according to the part or membrane attacked, might be simply classified under two heads, namely, colic and inflammation of the stomach and intestines. These two diseases admitted of an easy and general definition. Colic was spasm of the muscular wall of the muscular coat or any part of the intestines; whilst the other was inflammation of the seris, or of the muscular and mucous coats. When colic occurred within an hour or so after a full meal, its usual seat was in the small intestines, but at other times it arose from impaction of food in the large intestines. The spasm caused great pain while it lasted, and was due to nervous influence causing sudden contraction of the muscular coat, which necessarily arrested the motion of the part. The early sign of colic was pain, evidently in the region of the intestines, and was indicated by the animal looking around to its flanks. As the pain increased the patient would scrape with its fore feet, kick at its belly, walk round or throw itself down, and get up quickly or roll over or kick. The nature of the disease was further recognised by the fit passing away, for it was only a spasm. It, however, soon returned. There was an absence of fever in that affection and the pulse was only quickened during the spasm. During the attack the horse would sometimes pass hard, angular dung pellets. That peculiarity of hardness and shape was due to the spasmodic contraction of the gut. The belly was tense and sometimes preceptibly swollen and very sensitive to pressure. In some cases it was much distended by the generation of gases arising from undigested or improper food. That peculiar condition was known as flatulent colic. It was most common in farm horses. From pain, and knocking about, the horse sweated much, but dried as the spasm passed away. There was always danger when the horse threw itself about during an attack of colic, of it injuring itself by rupturing some internal vessel. Every effort should, therefore be made to encourage the affected animal to either stand or lie quietly during an attack, even if the services of several men were required for the purpose. If the disease were not soon relieved the pulse would become very frequent, contracting to a mere thread. After six hours duration there was ground for serious apprehension. Favorable indications were given by increase in the intervals between the attacks and by each attack becoming slighter. If the patient passed wind freely and soft dung that also might be regarded as a favorable sign. In pure colic the extremities continued warm and the skin remained in its natural state. The symptoms were only those of great spasmodic pain. There was no sign of inflammation. The causes of colic were various. The most common was error in feeding or watering. Among other common causes were worms, obstructions in the intestinal canal such as hair balls or harel binder twine when cut up in the chaff, and dust balls, from which millers' horses sometimes suffered, and the giving of draughts of cold water to overheated animals after their work was over. Colic might also be caused through indigestion by allowing animals to stand in a draught, or in a gelling through a dirty sheath. Sudden changes in diet or water and an excessive quantity of feed at one time, especially work on an empty stomach, were all predisposing causes of the disease. Colic generally ended favorably under proper treatment, but where rupture of an internal organ took place, brought about by the animal throwing itself about, a fatal ending ensued. Horses light in the loins, and "washy" colored animals were liable to colic, very slight causes bringing on an attack. When many attacks had occurred an animal generally succumbed in the long run to the disease or some of its complications. The treatment of colic needed careful consideration. In the first place it was wise to discover, if possible, the cause of the attack. That would help to decide the course of treatment, and also to prevent future attacks. The first thing to do was to rub the belly thoroughly. That would increase the motion of the intestines and draw the blood to the surface. A handful of clean straw was the best to use. The legs should be well rubbed, and in a very bad attack they should be clothed in flannel bandages. Ammonia liniment was a good thing to rub on the abdomen. The giving of medicine was necessary, and would often cut an attack short. Two ounces of spirit of nitrous ether, with an ounce of tincture of opium and half an ounce of aromatic spirits of ammonia given as a draught in a pint of water made an excellent

colic draught. Few remedies, however, exceeded the sedative effects of camphor combined with nitric ether, a drachm and a half of the former and an ounce of the latter, given in 12ozs. of water. An enema made by mixing 2ozs. of linseed oil with two quarts of water well shaken together, should be injected. By depressing the animal's tail it might be induced to hold the water for 10 minutes or so. The object of that was to induce contractive action of the bowels. If that treatment did not cause relief then a stimulant composed of four or five drachms of aloes given in one and a half ounces of nitrous ether should be given. If throughout the treatment the animal could be induced to lie down so much the better. If after two hours of the above treatment the spasm continued hot fomentations should be applied by steeping a rug in hot water and holding to the affected part. To prevent chill ammonia liniment should be applied to the abdomen. If the affected animal did not show rapid improvement under the above treatment it might be taken for granted that other symptoms had set in, and skilled attention was urgently needed.

CRYSTAL BROOK, March 10th.—The Secretary of the Experimental Committee read the report of the year's work, in which he stated that plots 1, 2, 3, 4, 5, and 6 were sown on May 22nd and 23rd, 1916. The six plots were treated with 45lbs. of phosphate (36-38 per cent.). One-half of No. 4 was treated with sea shell, and no difference in growth could be detected. Plots 7, 8, and 9 were treated with 30lbs. of phosphate, and plots 10, 11, and 12 with 20lbs. of phosphate per acre. Yields—No. 1, Bayah, 25bush. per acre; No. 2, Commonwealth, 20bush. per acre; No. 3, Moriah, 20bush. per acre; No. 4, Dreamought, 30bush. Nos. 5, 6, 7, and 8 were all down badly, and were all reaped together. No. 9, Marquis, yielded 18bush. per acre, but shed out badly. No. 10 was mixed seed. No. 11 Huron, mid-season, strong straw, held grain well, yield, 37bush. per acre. No. 12, Prelude, shed grain badly; very early; yield, 23bush. per acre. Nos. 10, 11, and 12 were obtained through Sir Joseph Carruthers, direct from Canada, and should improve another year.

WHYTE-YARCOWIE, March 10th.—Discussion took place on the result of the harvest. The general opinion was that the harvest had been very satisfactory. The crops had been very late, but the yield good. The sample was good and free from smut. Mr. F. H. Lock said that his experience showed that Federation was the wheat for the district, yielding better than other varieties, standing up well, and was easy to reap. Clean land yielded best. Wherever mustard or other weeds grew the wheat yield diminished. All members were agreed on that point. Mr. A. E. Green said that the good germination at seeding time was largely responsible for the good harvest.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

#### LOVE PINN.

March 6th.—Present: 20 members and one visitor.

THE BOT FLY.—The bot fly was dealt with by Mr. J. A. Buttfield, in a paper in which he described the external appearance of the insect, and in dealing with its habits remarked that in summer the female fly hovered over the horse, then suddenly descended and deposited her conical white eggs among the hairs of the animal's shoulder or inside the knee. The eggs were attached to the hair by means of a sticky fluid. The eggs hatched in a week or 10 days, and the larvae, crawling about, so irritated the skin that the horse licked the maggots off and swallowed them. In the stomach they attached themselves to the coating by means of the little hooks. There they lived through the autumn and spring, causing irritation and inflammation. Eventually passing out in the dung, they pupated in June, and the imago appeared about a month later. The larvae might be found in the rectum of the horse in great numbers in the early summer. To combat the fly in the first instance it was necessary to keep the animal's hair short, and apply a strong-smelling solution to prevent the fly from settling on it. The hair of the horses at grass should be frequently examined, and eggs removed by means of warm water in which a little soda had been dissolved. The horses should live under pure and healthy conditions, and in that way it would be enabled, if attacked, to withstand more effectually the effects of the internal discomfort.—In answer to a question, Mr. Buttfield recommended train oil as a solution which would keep bot flies



away. Mr. J. G. Hoffmann advocated the use of a mixture of one part oil of tar and 10 parts of olive oil, and also that the horse should be washed three times during the summer.

#### RIVERTON (Average annual rainfall, 20.48in.).

November 18th.—Present: 19 members and one visitor.

**SANITATION ON THE FARM.**—Although at first thought, observed Mr. F. Phillips in a paper on sanitation on the farm, the subject might not seem very important, when it was examined it appeared that it required more attention than it was usually given in farm life. It might be argued that the health of the farmer and his family was above the average of people in other walks of life. That might be so, but it did not follow that sanitation on the farm received sufficient attention. Every farmer had to fight the house fly to a certain extent during the summer months, both in the home and out in the field. He did not contend that the various methods that could be used were going to wipe out the flies, but they would help to a large extent to decrease them, especially if everyone recognised the danger which flies were to human beings as well as a torment to animal life, and helped to fight them. First they should examine the stable, where they would find one of the main breeding grounds of the fly. Manure left in the stable over one week was soon hatching out its batches of young flies. During the harvest months it was very difficult to find time to keep the yards and stables free from manure, and of course the farmer had to let it go and wait for a wet day. If about every three or four days they would take the trouble to throw some gypsum over the manure in the stable and manure heaps it would prevent flies from breeding to a very large extent, and, at the same time, enrich the manure. Failing that residual oil could be used. It was a cheap disinfectant, costing about 8d. or 9d. per gallon, when diluted with water. A strength of about 1 in 1 could be sprayed over the manure every third or fourth day with good results. That oil was largely used in all military camps to prevent the fly nuisance. Then there was the cowshed, which needed more attention than it received. Often, during the very height of summer it was as much as one could do to milk with two hands because of the flies. In milking care should be taken that all buckets, &c., were clean, scalded, and free from dust. The cow's teats should be well washed, and as a precaution a brush kept for the use on the cow's belly and udder to remove any small pieces that might otherwise fall into the milk bucket. In America, where large numbers of cows were kept, they had vacuum cleaners which they ran over the cow and removed particles of dust before the herd was milked, thus enabling them to overcome the dirt nuisance and give a healthy, clean product for consumption. In the average farm closet pit, pan, or septic tank was used. If pit or pan were provided plenty of disinfectant should be used. Lime was a fair disinfectant, but residual oil mixed with sawdust was better when applied each time the closet was used. It also kept flies away, and prevented them breeding. A septic tank was by far the best plan, but could only be used where there was a good water supply. The cost of erection was supposed to be about £15, but he believed that it could be done more cheaply, and £10 to £12 should cover the cost, if the farmer supplied most of the labor. When once erected a septic tank would last a lifetime without much trouble. Until sanitation could be practised on the farm with some idea of a system through the State all farmhouses should be supplied with wire screen doors, windows, and over the chimney during the summer, both from a health point of view and comfort. The best means to get rid of wash-up water from the house was to dig a big hole about 6ft. x 6ft. down to the wash dirt, and fill up with stones or clinkers to within 2ft. of the top. Then a drain should be made about 6ft. or 8ft. in length leading to the pit, and should be paved with bricks, or a sheet of galvanized iron. Straw should be placed in the drain, and all fatty substances would adhere to it. The straw could then be burned, and the drain replenished with fresh straw. Occasionally some disinfectant could be sprinkled in the pit. The paper was well received by the Branch. Members agreed that it was a subject that was overlooked. If some system were entered upon by each occupier it would add much to the home, both in regard to health and comfort.

#### SALISBURY (Average annual rainfall, 18.57in.).

February 6th.—Present: 13 members.

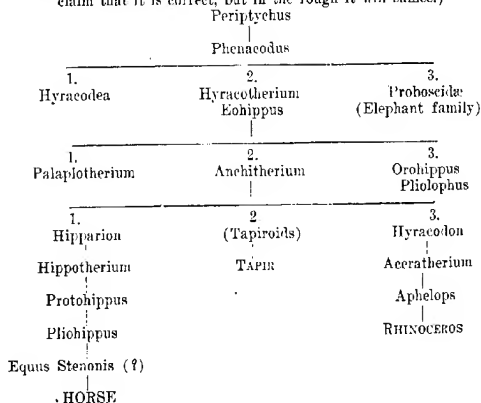
**THE EVOLUTION OF THE HORSE.**—Mr. R. W. Cilento read a paper entitled "The Evolution of the Horse," as follows:—"I have chosen the horse as a subject of this paper, firstly, because it is an animal familiar to each of us, and, secondly,

because it presents a history—actual and fossil—which is perhaps the most complete evolutionary story as yet recorded. In preparing my notes I have consulted a number of authorities, and practically the whole of my paper consists of extracts from one or other of their works, cemented together with an occasional idea of my own. With regard to the theory of evolution itself, some may remember my speaking on it recently, and it is my intention to-night to take it for granted, merely remarking that though as yet our records are imperfect, although immense and varied, every new discovery has tended to corroborate, and nothing has ever been found inconsistent with the view that all living things have acquired their present forms by the modification of pre-existing forms. The horse has been associated with man for thousands of years. Long before the dawn of history we find evidences that the men of the Stone Age hunted and ate the horses that roamed the pastures of Europe, domesticated them later, and used them in various ways, sometimes amusing themselves by scratching drawings of them on walls of caves or on bones, where thousands of years later they have been found. We know from Biblical records that Jacob used horses, and we find, in Kings, a reference to Solomon's purchasing of horses bred in Egypt. Three thousand nine hundred years ago we begin to see the horse in the monuments and on the tablets of Egypt, and later on again references are frequent and varied. Thus Herodotus, 'the father of history,' writing about 450 B.C. about the country north of the Danube, says:—'The only people of whom I can hear as dwelling beyond the Ister are the race named Siganæ, who wear, they say, a dress like the Medes, and have horses which are covered entirely with a coat of shaggy hair five fingers long. They are a small breed, flat-nosed, and not strong enough to bear men on their backs, but when yoked to chariots they are among the swiftest known, which is the reason why the people of that country use chariots.' A countryman of Herodotus, Xenophon, writing 2,300 years ago, has left us an excellent treatise on the horse which may interest you:—'The first thing,' he says, 'that ought to be looked at is the foot, for just as a house would be of no use if the lower part had not a proper foundation, so the horse would not be of any use in war if he had tender feet even though he had all other good qualities, for his good qualities could not then be made any valuable use of. Thick hoofs make a horse's feet better than thin ones, and do not forget to see whether the hoofs are high or low and near the ground, both before and behind. The pasterns or bones immediately above the hoofs and below the fetlocks ought not to be straight, like those of a goat, for this would shake the rider, and such legs are more subject to inflammation, nor ought these bones to be very low, for the fetlock would thus be chafed and ulcerated if the horse was ridden over ploughed land or among stones. The bones of the leg ought to be large, since they are supporters of the body, but not, however, thick with veins, or with cellular substances. If the colt in walking bends his knees freely you may judge when he comes to be ridden that his legs will be supple, and supple joints are justly commended as they make a horse less liable to stumble and not tire so soon as when his joints are rigid. The forearms, when they are large, are both powerful and graceful, and the chest being large contributes not only to beauty and strength, but to a horse being able to continue a long time in the one pace. The neck should proceed from the chest curving upwards, and it should be loose about the bend of the head. The head itself being bony should have a small cheek. The eye should be standing out and not sunk in the cheek. The nostrils that are wide are not only better adapted for breathing than those that are compressed, but give the horse a more terrifying appearance in war. The top of the head being large and the ears small make the head appear more elegant, the point of the shoulder likewise being high renders that part of the body more compact. The sides being deep and swelling towards the belly make a horse in general more easy to be seated on and better able to digest the food. The broader and shorter his loins are the more readily will he throw his forefeet out, and the belly that appears small, although large, not only disfigures a horse, but makes him weaker and less able to carry his rider. Haunches should be large and fleshy to correspond with the sides and chest, and when all these are firm they make a horse lighter for the course and fuller of animation.' So much for the Greek horse. Terentius Varro, who lived about 70 B.C., has left us an interesting description of the horse, which perhaps could not be bettered by many a skilful horse fancier. He says:—'We may anticipate great things of a colt if, when running in the pastures, it is ambitious to get before its companions, and if, on coming to a river it strives to be first to plunge into it. His head should be sn'.

his limbs clean and compact, his eyes bright and sparkling, nostrils open and large, his ears placed close together, his mane strong and full, his chest broad, his shoulders flat and sloping backwards, his barrel round and compact, his loins broad and strong, his tail full and bushy, his legs straight and even, his knees broad and well knit, his hoofs hard and tough, and his veins large and swelling all over his body.' The horse of the Romans (who after the Greeks dominated the known world) was, however, until a later date, an inferior animal, and whenever Romans and Greeks met in battle the cavalry of the former was constantly defeated by that of the latter. Julius Caesar used horses from France against his great rival, Pompey, and easily rode down the inferior Roman breed. Until the Romans adopted a heavier type of horse from Asia the Asiatic breeds always triumphed over the European. As regards the horses used in Libya and Numidia, Adrian tells us that they were slenderly built, carried little flesh, and subsisted on scanty herbage, while the Egyptian horse, as we see it in wall paintings and carvings, was a heavy lumbering type with a large, coarse head, high crest, and a body like that of a Flemish draught. The horse of the Britons that was first recorded was there before the Romans came and invaded the country. Dion Cassius tells that near London and Dover Caesar met cavalry and chariots, which formed the chief arm of the British, whilst in the highlands of Scotland the ancestors of the Scotch (the Caledonians and Mœtæ) did not ride to battle, but drove in chariots, because their horses were so small and swift. So much then for early references. As regards the uses to which horses were put we have also some statements. In Greece, 774 B.C., the Olympian Games, four-yearly contests, were instituted, and at the 23rd Olympiad, 680 B.C., horse racing was for the first time a feature. The course was four miles long, and on the first two occasions the horses were ridden, but following that were always driven in chariots. The speed and endurance of the animals were tested by the distance, while the ability of the driver was displayed as he rounded the pillars and avoided the obstacles that rendered the path difficult. The most common use of the horse by far was for war. The Greeks rode without either saddle, bridle, or stirrups, and guided the horse either with a stick or with the finger tips. It was taught that a touch on the right side of the face meant to go to the left, a touch on the muzzle halt, and a heel in the flank go ahead. The horse's mane was cut either in an arch or in a highly-crested line decorated with bells and ribbons, or was parted and turned equally over each side, or again, was combed over to the right. Later this combing to the right became general, and the rider took advantage of it to mount, for the ancients mounted always on the right. Although we mount always on the other side, as a rule we still comb the mane to the right. Having no stirrups it was usual either to vault on to the back of the horse or to use the neck or back of a slave or a mounting post as a foot rest, and later it was customary to have a loop 2 ft. up the shaft of the spear which served both to mount and to make the hold of the spear more secure. Arrian relates that the Persians used no bridles, but governed their horses by means of a thong cut from rawhide and bound across the nose. Inside this little brass or ivory teeth were placed, and a small bar of iron was placed in the mouth. To the ends of this the reins were tied, and when pulled upon the sharp little teeth compelled the horse to obey the will of its rider. Later the Greeks invented the snaffle bit, and both rode and drove with it, and later again the Romans invented the curb bit. No shoes were worn, but if the hoof gave out and the animal went lame they used a kind of sandal tipped with iron, or in the case of Nero, with gold. History and research confirm us in the belief that the earliest horses were small and shaggy, and we can hence readily imagine that until crossing and careful attention—selective or evolutionary breeding, in short—had been practised, and had resulted in a larger type, horses were too small to ride, and were used as Herodotus, Caesar, and Deon Cassius tell us, only for chariots. About 400 B.C. the men of France went to war in chariots, but 300 years later they were riders. They had imported new strains, and had developed heavier horses that were capable of being useful either as chariot horses or as cavalry, and had themselves become not only charioteers but also expert horsemen. It was 1,000 years later, in the time of the Normans (when William the Conqueror came over to England) that horses were first used in agriculture, and the Normans too were the first we know of who used the stirrup. Now as regards the horse itself. The horse belongs to the vertebrata, i.e., backboneed animals, and to that class of vertebrata called ungulata, i.e., hoofed animals; and of the ungulata it belongs to the odd-toed division, i.e., perissodactyla. It is described as having a tail hairy to the root, small callosities or corns on the inner sides of the hind legs just below the hock or heel joint, in addition to the

ones on the forelegs, common to its relatives the donkeys; a longer flowing mane with a forelock, shorter ears, longer limbs, broader feet, and smaller head. Its grinders or cheek teeth have large crowns with ridged surfaces; it does not lose its milk teeth until it has nearly attained maturity. It has no collarbones (or clavicles). Its limbs are used for carriage, its toes are blunt with broad nails more or less surrounding or enclosing the ends, and called hoofs. This, then, is the horse as it is. What can we say of the horse as it was? As you know the earth's surface has gradually been built up by successive deposits of soil, and if they never had been disturbed you can easily appreciate the fact that the newest would be those on the top and that the further we dug down the older the rock, and the further back in history the animals we find in it. For convenience of description and other reasons these successive deposits have received different names, and the bones of the animals found in them have been ascribed to particular periods, *e.g.*, Eocene, Miocene, Pliocene. There are two lines of proof of the evolution of the horse:—(1) From bones of its ancestors; (2) from vestigial remains in the body of the horse itself. We are taught that the one-toed horse descended from a five-toed ancestor, and that the change was brought about (a) by changes of surroundings, both as regards soil and food; (b) by selective breeding or natural selection; (c) perhaps by an inherent tendency to develop along certain lines. Long ago Huxley said:—'The knowledge we now possess justifies us in the assertion that as discovery proceeds animal forms with four toes and a rudiment or remnant of a fifth will be found, while in still older forms the series of digits will be more and more complete until we come to five-toed animals in which the whole series must have originated.' This statement has now been completely verified by the discovery of an animal called *Phenacodus*. This animal has hoofs, no collarbones, and lives on herbs and grasses. It was the first ungulate and was a definite type. It had a very low type of brain, and possessed i.g. c.f. p.g. =  $11 \times 2 = 41$  teeth, which is the common number of teeth found in tertiary types, and still exists in the pig and some insect eaters, and very rarely in some horses. All teeth formulae are a modification of this formula. The tail of the *phenacodus* was long and trailed on the ground, its shoulderblade and its upper arm were of the same type as the flesh-eating animals from which it was descended; it had five toes, and it walked not on the whole sole of its foot as we do, nor on the tips of its toes as the horse does, but at a halfway stage. Following the *phenacodus* we have an animal called in Europe *Hyracotherium*, and in America a very closely allied type, the *Eohippus*. From these, as you see on the chart, sprang a number of forms, making up a large family—the Lophiodon family—and from these we have three main branches, closely related, of which the representatives to-day are respectively the tapirs, the rhinoceros, and the horse family.

(This chart, by the way, was compiled by me from various sources, and I do not claim that it is correct, but in the rough it will suffice.)



To take each family in brief. *Tapirs*.—Heavy, thick-set animals with short stout limbs, the forefeet have four toes each, are hoofed with a large round callous pad for walking. Its nose and upper lip form together a small trunk or proboscis, its eyes are small, like those of a pig; its ears are moderate size, ovate, and erect; its tail is very short; its skin thick and smooth, with short harsh and rather scanty hair. In its habits it is solitary, and goes about at night. It is shy, inoffensive, and frequents the depths of shady forests and the neighborhood of rivers or water-poles; it feeds on vegetables, and has perhaps persisted as at present for a longer time than any other type has remained unchanged. *Rhinoceros*.—Has a large head; moderate ears, oval, erect, prominent, and near the back of the head. Its eyes are small, its neck short, its skin extremely thick, indurated, and in some species forms thick plates. The hair is scanty, the tail moderately long, slightly tufted at the end, and its limbs are stout and short. Each foot has three toes, with distinct broad, round hoofs. It has in most cases one or two horns in the midline of the face. It is a modification from the stock of hyracotherium, as shown, and is generally unintelligent and shy, but if brought to bay is ferocious. Its sight is dull, but its hearing and scent are remarkably acute. It feeds on herbage and shrubs, sleeps the greater part of the day, and is fond of wallowing in mud. These, then, are the nearest living relatives of the horse, ass, and zebra family, and present many points of resemblance. They are not, however, in the direct line of the horse's ancestors. That animal, as has been said, and may here be seen, descended from the cohippus and the phenacodus. The cohippus had four toes and a rudiment of a fifth (sometimes wanting); its teeth were very much like those of phenacodus, and the great gap between the cheek teeth and the nippers, the 'bar' that makes it possible to use a bit, had not appeared. The crowns of the teeth, too, did not show the same pattern as those of the present day horse, but were already beginning to be modified along the parallel lines. The little animal was only about the size of a fox or dog, and was beginning to leave the marshes in which phenacodus spent its life and to take up its existence on the drier plains with the tougher vegetation that in that situation supplanted the juicy herbage of the marshes. This next animal, the anchitherium, had three toes on each foot, and was somewhat larger; a gap had appeared between its tusks (canines) and its cheek teeth, but it still had the same number of teeth as its ancestors, although it was now very evident that they were assuming the same shape and peculiar arrangement as those in the horse of to-day. Then in hipparion we have a larger three-toed animal with a large head, an ugly Roman nose, and probably long hair. It had under its eye a 'crumen,' or oil gland, and some say from this that it could not have been an ancestor of the horse; but, in this connection, it is interesting to note that the racehorse Bend Or had a depression strongly developed in this situation, and there are numerous other examples of its occurrence. The teeth of hipparion are very similar to the teeth of our horses, and show an undoubted relationship. Like our horses, too, it had lost one of its cheek teeth, and had six instead of seven. In this connection, as showing a relationship, it is interesting to note that occasionally a seventh tooth makes its appearance in a horse of to-day. When it does occur it is small, blunt, and badly formed. It is called a 'wolf's tooth,' and used to be pulled out by farriers when it appeared, under the mistaken belief that it affected the eyesight. Now this could possibly be so I leave to your imagination, as my own reason cannot supply a solution. It suffices to say that the appearance in a constant situation of that one tooth alone is sufficient absolutely to prove a relationship between the horse and some of his hypothetical ancestors. It is only met with in the upper jaw, never in the lower, and this point is interesting, because in the tapir, which I told you is a relation, it always exists in the upper, but never in the lower jaw, and this fact may be regarded as a further link. To come then to proto and pliohippus we have an animal like a large dog, some species as large as an ass, in which the three toes no longer touch the ground. The middle one is short, broad, and strong, and takes most of the weight. The other two are drawn up like the hoofs of a cow or pig, or rather even more like the so-called 'dew claw' of a dog. Some types had altogether lost these now useless appendages, and were very equine. Its teeth are essentially horselike and its habits seem also to have been. The stages between are filled by animals which more and more resemble the horse of to-day. The other hoofs or toes are less and less marked, until you have in the horse only the splints remaining. In ancient horses these were always distinct and separate, but with us even these are tending to disappear, and often in old horses are completely joined with the cannon bone and have no separate existence. In course of time

they will tend absolutely to disappear. Such briefly and very cursorily is the history from fossil bones. These changes were assisted by changes in climate in the nature of surroundings and in food. The difference between the marshy lands, where a spreading five-toed foot was useful, and the plains and uplands, where it was necessary to run on the toes, accounts for the gradual change in the foot, and the difference between the succulent plants of the river edges and the harsh grasses of the plains accounts for the small changes (which nevertheless are characteristic) in teeth and in facial feature. How quickly these changes are brought about we can see in our own history. Professor Keith has pointed out that there is a great change in the skulls of men in the last 1,900 years. The eye socket has become more open and rounded at the edges, the cheek bones less prominent and angular, and these changes have been produced, together with differences in the formation of the jaws, the gums, the palate, and the teeth, by the simple act of chewing. It was the art of cooking that was responsible, for in the time of the Britons the uncooked food was exceedingly coarse, and anyone who has chewed grain from the ear will appreciate the jaw power necessary for an ancient meal. The Romans brought the art of cookery to England, and the Normans spread and elaborated it less than 1,000 years ago. Tough meat was rendered tender by boiling, and the power of the jaw was tremendously reduced, while modern machinery, with its minces, its soups, its tender meat, soft bread, cakes, and puddings, enables people to eat practically without chewing. If in 700 years this slight change could have produced a marked change in bony structures, how much greater ones would be produced in the horse during a period estimated roughly at three million years. As regards evolutionary proofs from vestigial remains in the animal itself I had intended to enlarge, but as your patience has probably been considerably strained already I will only refer to the feet, the splints, the teeth, the color, &c., very briefly. It must be stated, first of all, that occasionally by a throwback horses with more than one toe on each foot appear. Suetonius and Pliny both tell us that the favorite horse of Julius Caesar had three toes on each foot, on which it walked as an ordinary horse does, and the other two rudimentary. The horse Bucephalus, of Alexander, was probably of the same class, and a traveller named Siebold, a biologist, has described one he saw exhibited in a market place at a horse sale in 1860. So also has Frank, the Principal of the Veterinary College of Surgery at Munich. Then, again, Hensel points out the inner splint on the forefoot quite often has the rudiment of a hoof on it, and as this does not touch the ground, and is accordingly not worn off, it often grows long, horny, and irregular, as do some times the hooflets of old cows. Cases such as this prove the descent of the horse from an animal with more than one toe on each foot, and still more so do the occasional occurrences of what is called a 'stag horse,' in which all four feet present extra toes and have developed hoofs which bend over as they grow like hooks. I have referred already to the splints and their common fusion with the main bone as age progresses. This often occurs about the seventh or eighth year, and in any case the splint bones of ancient horses are longer, larger, and more bulbous ended than those of our day. With regard to the teeth, the earliest types show less complicated folds of enamel and are adapted for crushing, but they gradually change into the pillar-shaped molars of the horse, which, owing to their strength and the foldings of enamel, are suitable both for grinding corn and for chopping gritty grasses. It is easy to trace in a series of drawings the gradual change from the lowest to the most complex type. Something of this may be seen in the gradual growth of the teeth in the horse of to-day. You have the incisors, or 'nippers,' first narrow from front to back and wide across, then squarer, and finally three-cornered, being flat in front and ridged behind. The horse's teeth, of course, are characteristically marked by the 'mark' which disappears with age, and also by a yellow spot in front of the pit, which lasts after the latter has disappeared. The first permanent nipper appears, I believe, from two and half to three years, and the corner tooth at five years. The 'tusches' or canines are usually found only in the male, but are rarely found in mares as well. In both cases they are survivals pointing to earlier ancestors to whom they were useful. As regards color, it is often interesting to note that by a throwback the horse resembles the zebra or the ass. Dun horses especially frequently exhibit a dorsal stripe right down their backs and a shoulder stripe or two, while the upper part of the foreleg is frequently striped crosswise. These markings may or may not exist together, but are always interesting. Finally, although the horse only has one toe it has in the leg the muscles that serve in other animals for all five toes, and although they have in many cases been adapted to other uses their existence is a strong piece of

confirmatory evidence that the horse originally had five toes. When one considers that the shaggy Shetland pony, the horse of Przewalsky, the huge draught, and the clean-limbed racehorse are admitted without hesitation to be one family, it is amusing to remember that people insist with acrimony that animals which present far less differences than these do are totally unrelated. I am sure the time will come, if it is not already at hand, when such theories will be as dead as the dodo. I have only touched lightly this very wide subject, but I hope that there has been a little, at any rate, in my paper to claim your interest, and I must thank you for your kind attention."

LONE PINE, January 30th.—Mr. J. A. Hoklas read a paper on suitable wheats, and said that, in the event of early rains, he would sow a variety of late wheat, such as Baroota Wonder, Marshall's, White Tuscan, or Leather Head. Those were good varieties for grain or hay. In sowing late wheats, he would use 11bush. of seed and 112lbs. of super. to the acre. Last year his Baroota Wonder had yielded 16bush. to the acre, White Tuscan and Leather Head about 18bush., and Marshall's about seven bags. He favored the floor picking of seed wheat, using half a pound of bluestone to three galls of water, which would pickle about 8bush. of wheat. After some discussion the Branch decided that the following varieties of wheat were most suitable for the district:—For hay—Baroota Wonder, White Marshall's, White Tuscan, and Leake's Rustproof. For grain—Red Teagle and Federation. In picking wheat, members favored floor picking with a solution of 1lb. of bluestone to 4galls. of water for 9bush. of seed.

SALISBURY, March 6th.—An address was delivered by Mr. G. Quinn (Horticultural Instructor) on the cultivation and manuring of citrus trees. At the conclusion Mr. Quinn answered a number of questions, and was accorded a hearty vote of thanks.

TWO WELLS, February 6th.—Mr. A. Pratt displayed several varieties of wheat in and out of chaff, which he had been selecting for a number of years. He urged upon all farmers the necessity for growing clean wheats, even though the seed cost more. There was no excuse for growing smutty wheat.

TWO WELLS, March 12th.—A paper was read by Mr. L. H. Dawkins in which he set out the conditions under which sub-agents dealing with wheat for the Wheat Harvest Board work. He detailed the routine work of weighing and issuing certificates, and the difficulties surrounding the reductions in prices through wheat being smutty or containing barley.

## WESTERN DISTRICT.

### SALT CREEK.

March 10th.—Present: eight members and one visitor.

GROWING OTHER CROPS THAN WHEAT.—Other crops besides wheat should be grown, to enrich the land, observed Mr. W. Lee, jun. in a paper on that subject, in order that they might keep more stock and spread the harvest over a longer period. Next to wheat, oats provided the most profitable crop, and a much larger area could be sown with profit, in order to provide fodder for stock on the farm. In most years a good return of grain could be obtained, and a big stack of hay could be cut as a standby for times of drought. Another good crop to grow was peas. He had tried two acres with satisfactory results, keeping 100 fowls for six weeks. He just raked the peas and carted them as required. The fowls did the thrashing. Turnips were worth growing. He sowed 11b. of seed with the peas. He was able to get a wagon-load at a time and feed them to the pigs. Berseem in that district was a failure without irrigation. Kale did not do well.—Mr. W. Lee, sen., considered that kale should be grown by itself. Mr. W. Gale had not been very successful in growing oats.

YADNARIE (Average annual rainfall, 14.09in.).

March 13th.—Present: 12 members.

GATES ON A FARM.—Every paddock should be possessed of a gate, remarked Mr. W. F. Banks in a paper entitled "Gates on a Farm," and according to the position of the paddock, the sort of gate was a matter for consideration. If the pad-

dock were so placed that the public were continually going to and fro a panel gate, or even a four-wire and stick gate should be erected. If a panel gate were provided he advised that the words "Please shut this gate" be printed on it. In many cases he had seen simply a wire or two pulled across the gateway. The wire gates with sticks were much more serviceable, but still only makeshifts. For a large farm he preferred wire and stick gates for distant paddocks only in use during the harvest time. It was unnecessary expense to have too many double gates. He advised one gate, swung on a good strainer, with a wire catch to loop over, or, better still, an iron catch. To the public the wire gate or gates broken and fixed up with wire, and not swinging, caused a very great annoyance, because they tore clothes and flesh, and wasted time. Mr. A. Spriggs said that in fixing a wire gate it was better to use the link of a chain at each end of the wire. A very satisfactory sheep gate could be made with two sticks, three wires, and a piece of netting wire with two or three droppers to prevent the wires becoming tangled. Mr. J. Deer advised the use of a manufactured gate on roads extensively used by the public. Mr. A. J. Hutchinson considered it unnecessary to fasten the road gate of a paddock unless the paddock was to be cultivated. Mr. J. H. Kruger said that that was the second time the paper had been read, and since the first reading there had been an improvement in the gates in the district. Mr. W. L. Brown considered that the main gates should be the best the farmer could afford.

KOONIBBA, February 1st.—Discussion took place on the occurrence of black rust and takeall in wheat, and the means to be adopted to prevent or destroy them. Opinions differed as to the efficacy of bluestone pickle for the prevention of smut, members relating their experiences under varying conditions.

KOPPIO, March 6th.—Mr. J. Newell, the Chairman, presented the fourth annual report on the work at the experimental plots. The three plots, which were 1 acre in extent, were ploughed on April 22nd, under rather dry conditions, and were drilled on May 3rd, with 2bush. of Caledonia Cape oats and 1ewt., 2ewts., and 3 ewts. of mineral super. per acre. The land was harrowed after drilling. The crops came up fairly evenly, but suffered through excessive wet, and became rather patchy. Growth was fairly even, but slow. Crops harvested on December 9th. Results:—Plot 1—1ewt. super. and 2bush. oats per acre, yield 33 sheaves, equal to 329lbs. Plot 2—3ewts. super. and 2bush. oats per acre, yield 30 sheaves, equal to 287lbs. Plot 3—3ewts. super. and 2bush. of oats per acre, yield 30 sheaves, equal to 316lbs. In the discussion which followed there was a consensus of opinion that about 1ewt. of super. per acre was the most profitable dressing for most of the land in that district.

YALLUNDA, December 2nd.—Mr. T. Forrest initiated a discussion on the question how competition with other countries would be carried on after the war.

YALLUNDA, March 8th.—During the course of a meeting which took the form of a social evening, Mr. F. Olston (Chairman) delivered an address on the advantages which had been reaped from the work of the Agricultural Bureau, and he appealed to all to become members. Mr. R. B. Jenkins initiated a discussion on experimenting. Each district, he pointed out, required different treatment, and an experimental farm in any one district would not answer the purpose. It would be too expensive to establish experimental stations in every district. Something was lacking in the soil, and super. did not yield the return it should. They did not seem to have the right class of manure for that part of the country. He advised growing oats, getting rid of mallee shoots, and keeping sheep. Mr. Gardiner said that some plant foods were essential, and experimental work should be undertaken to ascertain what was lacking in the soil. Mr. Trigg advocated mixed farming. Mr. Proctor said that experiments were required on the poor soil, and the farmer could not afford to experiment, because it took all his time to make a living. Mr. Roberts said that the Government should assist individuals in experimenting. Members were generally of opinion that experimental plots should be established in each district, with Government assistance.

YEELANNA, March 3rd.—Mr. R. Smith read a short paper setting out a few reasons why dams should be fenced. In the first place, the fencing of dams kept the water clean. If a farmer allowed his team, returning from work, to go into the dam and drink, one by one, the water was so stirred up and muddy for the later ones that they did not care to drink, with the result that they lost condition. The dam should be fenced and the water elevated to troughs by hand pumps or windmill, the latter being more useful to the farmer whose house and garden were



situated near the dam. An important reason why dams should be fenced was that horses frequently passed blood worms into the water with their droppings, and other horses drinking the water sucked up the worms with it. The water in a dam, if fenced, was fit for human consumption, but not otherwise.

## EASTERN DISTRICT.

### EAST OF MOUNT LOFTY RANGES.)

MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

March 10th.—Present: 10 members.

QUANTITY OF WHEAT TO SOW.—The principal considerations in determining the quantity of wheat per acre to sow, declared Mr. J. Hartmann, in a paper dealing with that question, were the size of the grain and the variety. The wheat should be clean, and should have been put through the grader or winnowing machine. All rubbish, cracked grain, or barley should be removed. The grading of the wheat mattered less than cleaning it thoroughly of weed seeds and barley. With large, plump grain 20lbs. extra per acre should be sown. The early sorts required to be sown more thickly than the better standing varieties. For average grain, 1bush. to the acre was sufficient, but some sorts, like Golden Drop, required at least 1½bush. per acre, especially if sown for hay. At least 1½bush. of oats per acre should be sown, and with barley 2bush. were not too much. Barley should be pickled at least one week before sowing, and it would then run evenly through the drill.—In the discussion, some members were of opinion that the quantities mentioned were correct for wet seasons, but in dry seasons considerably less would prove more profitable. In regard to barley, the opinion was that from 1bush. to 1½bush. was ample.

## RAMCO.

February 5th.—Present: nine members.

AN ASH DISTRIBUTOR.—The question of how to dispose of the cuttings after pruning, remarked Mr. G. Jackman in a paper on an ash distributor, was one which had caused considerable thought and discussion. So far as that district was concerned, there appeared to have been very little effort made to successfully deal with the subject. The fact that each year many pounds of good ash fertiliser were lost to the ground, owing to there being no proper means to distribute the ash after burning the cuttings was apparent. If that could be remedied growers would find a great improvement in the condition of their orchards. He had to admit that it was no pleasant thought to him to have to allow the potash to be lost each year, and after considerable thought he devised a means with the material at his disposal to overcome the difficulty. For the past three years he had been using the machine, and had found it very satisfactory. There were no very great difficulties to be overcome in the making of a suitable implement. While not claiming perfection for the device, and admitting that a more scientific implement could be made, the one he was about to describe would fulfil the requirements of growers in that district, and would be found to be very durable. He first procured a 400-gall. malt-ing tank, then a carriage upon which the tank was placed; that could be made from an old V-shaped scarifier frame with wheels attached, three of which were required. The two back wheels required to be fixed on the inside of the frame to prevent them coming in contact with trellis posts or trees. The bottom of the tank was partially removed, and a grating laid across the aperture. To prevent the heat, which was very great, injuring the vines or trees, a sheet of iron was fixed on each side and in front, the back being left open to allow the cuttings to be more easily put in the tank. It was necessary to put in a good mallee root before starting to burn the cuttings, because the root caused a good heat, and when well established, the cuttings, no matter how green, would burn very readily. On account of the heat it was necessary to have the horse about 10ft. away from the distributor. That could be easily done by using the ordinary trace chains. Mr. E. J. Burton said that he had assisted in working one of the machines at Renmark. It was large, and had four low wheels. It burned as fast as two men could feed it. Mr. F. Lewis commended Mr. Jackman's idea, provided it would pay. Mr. F. G. Rogers suggested that it might pay for several to co-operate. Mr. Jackman said that the machine did a clean job, and gave some manure, if only a little. Material and building cost £3 10s. Members considered that the machine would pay on a 15-acre block.

**RACK DRYING VERSUS TRAY DRYING OF FRUIT.**—Mr. E. Borroughs read a paper on the above subject, in which he said that in his opinion rack drying of fruit was preferable to tray drying, especially to a man who had to hire labor and had to depend on himself to cover the fruit through a sudden storm coming on—often in the middle of the night. Other advantages were that if the fruit happened to get wet it did not become mouldy unless very bad weather followed. With tray drying the fruit had to be turned every day, and became very dark in color. On the rack a better color was obtained, there was quicker spreading and less ground room was required for drying purposes. It also produced a cleaner fruit. It was thought by some that rack-dried fruit dried lighter in weight, but he had not tested it. The main complaint against the rack was the cost of material and erection, but a rack costing about £20 would dry as much fruit in a season as the same amount laid out in trays would. Trays with care lasted about five years, and required a lot of mending, whereas a rack would last about 20 years and did not require washing twice a year and putting away in the shed. Mr. F. G. Rogers said that rack-dried fruit was heavier than fruit dried on trays. Sawn timber for racks was cheaper and better than split posts. Mr. F. Lewis said racks gave more security and less worry than trays. During bad weather the drying process still went on. Mr. E. J. Burton considered it cheaper to go in for galvanized iron cover first. The initial cost was heavier, but it saved replacing expenses in two years.

**BERRI, March 7th.**—Mr. E. R. Moss read a paper on fodders. He dealt largely with the question of growing fodders on small dry blocks, and offered suggestions in regard to making the best use of the land for growing fodder for stock.

**COONALPYN, March 9th.**—Mr. A. Gurner read a paper in which he set out the necessity for keeping books. If no other method were adopted a banking account should be opened, and all moneys received should be paid into it, and all accounts paid by cheque. In that way, an exact statement of revenue and expenditure would be established, from which any bookkeeper could evolve a balance-sheet.

**ADVANTAGES OF A GOOD WATER SUPPLY.**—Mr. G. Venning read a paper dealing with the advantages of a good water supply. All farm stock, he said, should be well supplied with water, especially horses, which at all times should have access to a plentiful supply. Mr. Whitehead thought water could be more profitably employed on lucerne than on market vegetables. Mr. Wall would feed the lucerne to sheep and turn it into mutton in preference to feeding it to cows.

**GERANIUM, March 3rd.**—Discussion took place on harvest results, members agreeing that owing to the excessively wet winter the sandy ground did not give a good return. That, in conjunction with takeall in some of the older ground, considerably lowered the average, although the heavier ground yielded a good return.

**MYPOLOGA, March 7th.**—Mr. Muspratt delivered an address on irrigation, which was very well received.

## SOUTH AND HILLS DISTRICT.

### BLACKHEATH.

March 3rd.—Present: 12 members and five visitors.

**CULTIVATION OF FRUIT.**—In that district, remarked Mr. J. Pym in a paper on the cultivation of fruit, a large portion of the land was suitable for the cultivation of fruit, especially apples, pears and apricots. The site selected should be sheltered from storms. The wet parts could be planted with plums, pears, and quinces. Good healthy trees, not more than one year old, should be planted. On no account should old trees that had been cut back year after year in the nursery be purchased. He did not advise trying to run a large orchard in conjunction with the farm, but every landholder should plant about 50 assorted trees to provide fruit for the house. The present outlook, he said, did not warrant planting fruits on land that would grow lucerne, as the latter provided a quicker return, lasted for years, and, on the whole, paid better in proportion to the labor and capital expended.

# INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

March 8th.—Present: 11 members and one visitor.

**FODDER AND GRASS CULTIVATION.**—The cultivation of fodder and grass, observed Mr. E. H. Mayfield in a paper on that subject, was most important in connection with successful farming, especially in the South, where the rainfall was assured. Most of the farms were small, and it was necessary to cultivate the land in such a manner as to carry more stock. Ten acres of land cultivated for fodder would carry more stock than 80 acres of natural pasture. The best kinds of fodder crops to grow depended entirely on the quality and condition of the soil to be put under cultivation. He had had excellent results from rape and oats, grown on land previously cropped with peas, and the number of sheep it would carry and fatten was astonishing. Land for peas should be ploughed a fair depth, and not less than 25lbs. of peas to the acre, with 70lbs. of bone super., should be drilled in. Sheep should never be put on that crop until the peas were ripe. When ripe that fodder would fatten at least 10 sheep to the acre. They would command the top price in the market, because pen-fed lambs were well known by butchers. The land would be well manured by peagrowing and sheep running on it. Excellent results should be further realised by running the cultivator over it and drilling in about 15lbs. of oats, 6lbs. of rape seed, and 10lbs. of super to the acre. The best method was to run the drill shallow, because rape seed would not do well when buried too deeply. Harrows should not be used after sowing, but a light roller should be run over it. Best results were gained by getting the rape in ready for the first rains, because it then grew very quickly. In fact, in six weeks there was good picking for sheep. He had obtained splendid results from 10 acres treated in that way. It carried and fattened more sheep in six months than 100 acres of natural pasture. He put 38 ewes and 12 lambs in poor condition (bought at 10s. each) in a rape paddock. A day or so after purchasing them he offered to sell at 11s., which was refused. The sheep were left on the rape for three weeks, and were offered again. The same buyer who had refused the sheep before at 11s. purchased at 11s. 6d. per head, and did not know they were the same line of sheep. When putting sheep on rape it was necessary to be very careful not to allow them to remain in the rape too long at a time, until accustomed to it, because if the sheep were hungry there was a great danger of them being blown. There were many more excellent fodder crops, and perhaps lucerne was one of the best; but it required a certain amount of irrigation, and where there was not plenty of water to flood it well through the summer it did not do too well. Chou moulleur grew well. Where a few cows were being milked it would be found one of the most profitable fodder crops to grow. Half an acre would produce enough green feed to keep half a dozen cows in full milk for three months. The plants should be planted out about 3ft. apart, and the same distance between the rows. If put in the best soil it would pay well. In regard to grasses, there were too many good sorts to mention them all, but one of the best for that district was English rye, because it was a perennial, and would shoot after summer showers. Another good fodder when the land required a rest from wheat was rye grass, oats, and different clover seeds sown together. Those made a good coat of feed for stock, otherwise it took several years for land to regain its natural grasses after wheat growing. He did not favor berseem, because it required a lot of irrigation. He preferred phalaris for a winter grass. It was a hardy doer, and would grow anywhere and anyhow. Cold and wet weather did not seem to hinder its growth. Paspalum was another good grass, and did well on poor soil and kept green all the summer. A plot in that district had carried 24 sheep to the acre for three months without eating it down too bare.

# MILANG.

February 10th.—Present: 44 members and several visitors.

**THE WHEAT STANDARD.**—Mr. F. Kruse contributed a paper in which he dealt with the method adopted in determining the f.a.o. standard for wheat in South Australia. Among other objections which he had to the present system was the fact that when the farmer marketed wheat which did not come up to the standard, the price at which he was paid for the grain was decreased, but no increased price was given for wheat heavier than the standard. He suggested a fixed standard, say 62½lbs. to the bushel; inferior grain being docked, and superior grain being paid for accordingly. He thought that the only samples which should be used for the purpose of estimating a f.a.o. standard should be those forwarded by Hon. Secretaries of the Agricultural Bureau, and further, that the standard should be fixed by the Government.

## MILANG.

March 10th.—Present: 37 members.

**HANDFEEDING SHEEP.**—In a paper on the handfeeding of sheep Mr. T. B. Moss said that he proposed to deal with the handfeeding of sheep as a supplement to natural feed at such times as natural grasses were scarce. The majority of farmer's flocks in that district consisted principally of breeding ewes, which were kept for the purpose of raising market lambs. To obtain the best results from those ewes it was necessary that they should be kept in good strong condition throughout the season. Feed grown on cultivated land consisted mainly of dandelion, clover, and like grasses, which, though they produced abundance of feed in the spring, as soon as the dry weather came were quickly cleaned up or blown away, leaving little or no dry feed to last over the autumn. There was then the stubble feed, but when that was finished (usually about the end of March, should the autumn rains hold off) the sheep experienced a trying time until the green feed came, and it was then that the benefit of handfeeding was exemplified. Some farmers, when feed became scarce, sold a portion of their flock to save the others, necessitating buying again later in the season at a price considerably in advance of that at which they sold. Others, not wishing to sacrifice their ewes, kept them all, and allowed them to pick a living as best they could. Consequently the ewes became poor and weak, resulting in many losses at lambing time, of both lambs and ewes. Both of those practices entailed a serious loss to the farmer which could be easily avoided by a little feeding to tide them over the bad time. There were various ideas about feeding sheep, but he preferred to supply chaff and oats mixed. Ewes should be fed on somewhat similar lines to milk cows, and though chaff alone was good for them, the addition of a little bran or oats effected a marked improvement. Last year he fed to 100 ewes one bag of chaff and about a bushel of oats per day, and found that they kept their condition well on it. By handfeeding for two or three months of the year a farmer could keep at least 30 per cent. more sheep than without feeding and make a good profit thereby. The cost of feeding 130 sheep for three months, at the rate of 1lb. of chaff and 1lb. of oats per sheep per day would be as follows:—Five tons of chaff, at 50s. per ton, £12 10s.; 136 bush. of oats, at 1s. 9d. per bushel, £11 18s.; total, £24 8s. The return from the 30 extra ewes kept (at say 25s. each for lamb and wool) would amount to £37 10s., leaving a balance of £13 2s. in favor of handfeeding. That was a very moderate estimate, and was given as a possible average for a number of years at the present prices for feed, and for lambs the proposition would show a very much larger profit. Several different kinds of feeders might be used. If feeding on grain, light wooden troughing could be made fairly cheaply, but if feeding chaff something bigger was required. A useful feeder might be made from bags threaded on two wires and stretched between two posts or trees, with stakes driven on either side at intervals of about 6ft., and the wires tacked on the top of them to prevent the feeder sagging. Feeders should be about 25yds. long for each 100 sheep, allowing them to feed on both sides, and should be about 18in. high to the top. The sheep would not then walk in the feeder. One of the essentials for sheep was a good supply of water. Sheep would do well in the dry weather on a small amount of feed if they had plenty of water, but on the other hand they might have any amount of feed, and if they were short of water they would quickly lose condition. Sheep would do best if they had water to run to when they wished without being driven. About 12 months ago he purchased 100 two-tooth ewes in lamb, and as the season continued dry he was forced, about April, to commence handfeeding them. He found that by giving them the quantity of feed above stated they kept in good condition. He had not the least difficulty with them at lambing time, and they reared 98 lambs, which returned £114 6s. 8d. The returns for wool were £54, a total of £168 6s. 8d., or an average per sheep for the 100 ewes of £1 13s. 8d. Considering that those were maiden ewes, that was an excellent return, and was due to the ewes being kept in good condition right through. That could not have been accomplished without handfeeding.

NARRUNG (Average annual rainfall, 17in. to 18in.).

February 3rd.—Present: 11 members and one visitor.

**WIN THE WAR PRODUCTION.**—Mr. G. G. Hackett read a paper entitled "Win the War Production," in which he advocated increasing the yield of the dairy herds by better methods and better feeding. Pig-raising should be more extensively practised, and with the scarcity of sheep and cattle, pork and bacon must remain in good demand, and realise good prices. Even at low prices the pig gave a higher

return on the capital invested than most other animals. Farmers should also experiment in wheats and manures to obtain more profitable returns, and the area sown for potatoes should be extended. Increase in the production of cattle and sheep should be a feature in the farmer's win the war enterprise. Another reason for the making of a special effort was that the purpose of assisting those who returned to their district from the front should be kept in view. The returned soldiers would require all the help which could be given them, and if that district could show a greater capacity for improvement in agricultural and other products there was every reason why land should be obtained for the returned soldiers to enable them to secure permanent homes in that district. Mr. Goode considered that it was necessary to increase the production of foodstuffs. Although the district's main line was dairying, butter was an essential, and an important factor in supplying a nation's wants.

#### PORT ELLIOT (Average annual rainfall, 20.33in.).

February 17th.—Present: nine members.

**DIPPING SHEEP FOR TICK AND LICE.**—The law in regard to undipped sheep should be enforced, remarked Mr. Hamilton Welch in a paper on dipping sheep for tick and lice, because undipped sheep caused the spread of the vermin. It was a good plan for one man to construct a dip, and for as many owners as possible living within a few miles to make use of it, paying so much per hundred sheep. A useful pit should be 30ft. long, 5ft. deep, and 22in. wide on top, tapering to about 1ft. at bottom. The entry should be steep and sudden, with a bevelled slab built in the wall and made slippery, so that sheep could not hold their feet, and consequently fell into the pit when endeavoring to walk upon it. The outlet should gradually slope upwards, with cement steps to enable the sheep to walk into the draining yard. The walls of the pit might be built of stone or brick, cemented over to make them watertight. Sand or gravel was best for a foundation: clay was liable to swell and cause cracks. The receiving yard should be fairly large, according to the quantity usually owned in the district, with two or three smaller yards, finishing up with a small yard tapering into a race, where the sheep ran along in single file. One man and a boy could then regulate the pace at which they entered the dip, preventing too many from jumping in at a time, otherwise they were liable to drown one another or endeavor to breathe under water, which would cause death by poison. Another man, with a pole and small crosspiece attached to the end would push each sheep under, ensuring the submersion of each sheep and regulating the pace at which the sheep should swim through. At the outlet there should be two draining yards, a fence with a gate dividing them, enabling the first pen of dipped sheep to pass on to the second yard. By the time the second lot was put through the first lot would be nearly dry and about ready to turn out. When that lot was dry the second could be passed up, and so on. Convenient yards would measure 10ft. long by 4yds. wide, divided into two. That would hold about 60 sheep in each pen. The floor should be of brick with cement over the top, with a slope towards the dip, either draining in the centre or on the lower side, where a small wall was necessary to prevent overflow. The floors should be swept frequently to prevent too much manure washing into the dip. All sheep, including lambs of any size, from two weeks to one month, should be dipped after shearing. That would prevent the tick from laying their eggs in the wool. Scientists described the egg as a "pupa," or an encased young tick, which it was said would only live five days without food. He did not believe that dipping sheep would actually kill the tick, but it most certainly drove them off the sheep, and they died from starvation, because they could not live in the wool when sheep had been thoroughly dipped. To prevent the spread of tick it was necessary to dip early, dip well, and dip every sheep and lamb on the farm and see that one's neighbors did likewise. A few undipped sheep would spread tick through a flock, because the insects could live upon the sheep a few months after they had been dipped. The flock should be examined occasionally lest they should come in contact with undipped sheep. Sheep should not be dipped whilst thirsty or very hot.

#### STRALTHALBYN (Average annual rainfall, 19.28in.).

March 6th.—Present: 27 members.

**PLOUGHING AND CULTIVATION FOR THE GROWING OF WHEAT.**—Where a farmer was chiefly dependent for his living on the proceeds of hay and grain, premised Mr. T. D. Finney, in a paper on ploughing and cultivation for the growing of wheat, it

was absolutely necessary to practise a systematic course of fallowing. In regard to ploughing, most of the work should be done with a set implement, he said. Too many furrows resulted in unevenness in depth and hard patches. The narrow furrow slice was more often than not set on edge instead of being completely turned over. That was a most objectionable feature, and could not produce good results. He advised the throwing out of those ploughs, because they were unprofitable, and they should get possession of a good working plough, certainly a set one, if the clear acreage warranted it. A good sweeping mouldboard should be used, ensuring a complete turnover, with not more than five furrows, 8½ in. or 9 in. wide, with sufficient horse-power to plough down to 6 in. or 6½ in., according to the depth of the sub-soil. It was impracticable to do good work with less strength than 1½ horses per furrow, because in any stiff land the horses tired. If the subsoil should be at a shallow depth it would not hurt to turn up an inch of clay, because it soon worked up with 3 in. or 4 in. of surface soil, and tended to give greater depth in shallow places. After ploughing, if the land were likely to drift with the wind, the harrow should not be used. If there were no danger of that it should be harrowed once only immediately after ploughing. He was averse to using the harrow as a means of cultivation. They seemed only to fine down the surface, which was likely to set hard after a moderately heavy rain, a condition exactly opposite to the good derived from worked fallow. The cultivator should be used constantly, and they should keep on scratching as often as possible with it, not only when the paddocks were dirty, but whenever time permitted. The farmer should have a good idea as to the depth of his ploughing in different parts of the land under fallow, and at the first scarifying he should work as deep, or almost as deep as the plough. Subsequent working should be only 3 in. to 4 in. deep. The object in going deep the first time was that, under many conditions, ploughing was rough, and it would often take the sods a considerable time to set down closely and firmly, which was the first factor necessary to the formation of a perfect seed bed, and the following working at a shallower depth did not disturb that bed. It should not be forgotten that good, deep ploughing and cultivation in the first place tended to deepen the soil, and so allow the roots to draw moisture at a greater depth than was the case where the land was scratch ploughed. A good depth also to a great degree resulted in uniformity and evenness amongst cereal crops. He then proceeded to deal with the important part played by oxygen, nitrogen, and hydrogen in plant growth, and explained the necessity for allowing an abundant supply of air to reach the roots of the plant. Cultivation, he stated, was the chief factor in effecting a storage of moisture for the crop. By loosening the land the rainfall was prevented from running to waste. The spaces between the particles of worked land were far greater than in set land, and absorbed and retained a much greater quantity of moisture before becoming thoroughly saturated. As most of the useful rain fell in showers, with perhaps long intervals between, the growing crops were almost entirely dependent upon the retaining properties of the soil. He then quoted from an article on "Tillage and the Soil for Wheatgrowing," by Mr. W. J. Spafford (*Journal*, December, 1916, p. 369).

#### URAILLA AND SUMMERTOWN (Average annual rainfall, 44.35 in.).

March 6th.—Present: six members.

IMPROVING AND FERTILISING THE SOIL.—Mr. C. W. Kessell, in a paper on improving and fertilising the soil, expressed a high appreciation of the value of stable manure, not only from the point of view of its fertilising properties, but also because it made the soil friable and easier to work. Stable manure should contain straw or bedding of some kind that would absorb the urine, which contained larger proportions of nitrogen and potash. Two acres of land well fertilised were better than four or five acres of inferior land, involving the employment of less labor and giving better results. In addition to manuring, the land should be worked deeply, and then receive continual surface cultivation. A proper circulation of the air let into the soil was as important as any other factor of the plant growth, and also helped to supply proper plant food. The soil could not be worked too much. It was necessary to use artificial manures in conjunction with stable manure to stimulate and give leaf production. Stable manure should be well rotted, if possible, in order to prevent the germination of the seeds which it might contain. Manure that was carted on to the ground in the hot weather should be ploughed in as soon as possible, otherwise the ammonia, which was one of its chief constituents, would

be lost. Manure from cattle and swine contained a larger percentage of water than other animals, and was called cold manure. The manure from horses and sheep and poultry being relatively dry, fermented easily, and was called hot manure. Some crops, such as cabbages, lettuce, &c., needed ammonia or nitrate of soda as well as stable manure or bone-dust to help them mature. Some soils should not be worked if too wet, because they only puddled and set too hard. Soils which were ploughed and left through the winter should just be ploughed and left to lie as they were turned over, so that when the weeds came up the ground could be cross harrowed. Otherwise, if harrowed and rolled, the ground would set, and the weeds were not so easily moved by the harrows. In the hot weather mulching helped to keep the moisture in the soil, and kept the ground from setting too hard when watered, and became free and loose to work. The ploughing in of green crops as manure was another method of improving the soil, and was not generally practised, but when a supply of stable manure was not available, that would be a considerable help. Peas were one of the best green crops to grow. It was necessary to sow one and a half bushels to the acre in spring or autumn.

MOUNT COMPASS, February 10th.—Members met at the garden of the President (Mr. M. Jacobs) and made a tour of inspection of the local gardens, which proved interesting and instructive. Later on, at the residence of Mr. A. H. Simons, members discussed what they had seen during the afternoon, and general satisfaction was expressed at the information which had been gained.

## SOUTH-EAST DISTRICT.

### KONGORONG.

March 6th.—Present: eight members and four visitors.

A paper was read by Mr. C. T. Atkin on the garden on the farm, in which he advocated the establishment of a vegetable garden on every farm. A windbreak was also essential to protect the garden, and for that purpose trees should be used in the same manner as a paling fence. There should be a fair depth of soil and plenty of water should be used in conjunction with suitable fertiliser. A heavy dressing of stable manure dug in once a year proved very effective. Members generally agreed that a garden was of no use without a windbreak, and that the garden should be dug to a depth of 18 in. The experience of the writer of the paper went to demonstrate that melons, pumpkins, peas, beans (broad and French), cabbage, cauliflowers, carrots, parsnips, lettuce, red beet, spinach, tomatoes, cucumbers, artichokes, radishes, and rhubarb did well in that district. Gooseberries, loganberries, strawberries, and raspberries could also be profitably grown.

### KYBYBOLITE (Average annual rainfall, 22 in.).

March 8th.—Present: 13 members and one visitor.

VEGETABLE AND FRUIT GROWING ON THE FARM.—The first consideration in vegetable growing, observed Mr. H. Douglas, in a paper on vegetable and fruit growing on the farm, was to consider the class of land available. Land of a heavy nature was pre-eminently suited for all vegetable growth. Secondly, there was good chocolate loam, with a good clay subsoil to retain the moisture, and thirdly a sandy loamy soil, which was good for potatoes and onions, where water was available. In regard to the time of planting, what to plant, and how to plant it would be well, commencing in August, to sow peas (Yorkshire Hero for preference) from the first to the middle of the month. Carrots, parsnips, and beet should be sown, the two last-named in quantities to last all the season, because what was known as middle crop was not suitable for that district. Cabbages might also be planted and continued at intervals of a month until the end of October. At the end of August turnips and swedes should be planted, sowing the latter in small beds, suitable for requirements. Lettuce should be put in in small plantings until the end of September, and kept growing vigorously, because success depended on quick growth—say eight or nine weeks. Frequent applications of ammonia or nitrate of soda were very beneficial. French beans should be sown in November to avoid the frost. Marrows, trombones, cucumbers, &c., should also be sown. Heavy

dressings of stable manure were suitable for these, with plenty of water, because the ground in that locality dried up very quickly. Constant watering was necessary, and constant applications of fertilisers; small quantities and often being better than one heavy dressing. Potatoes might be planted at the end of October. In planting the ground should be given a good heavy coat of stable manure, which should be ploughed in, say nine months before sowing time. The soil should be harrowed and scarified to produce a fine tilth. When planting furrows should be hoed 2ft. apart, and 1ft. between the sets. The land required to be ploughed deeply, and should be planted outside of the furrow in order to have loose soil beneath the set, which should be between 4in. and 5in. deep. When planting a handful of bonedust and potash should be sown to each step along the sets, the mixture being in the proportion of half a ton of bonedust to 1cwt. of potash. A site for an orchard should have a gradual slope to allow for natural drainage, with a shelter from prevailing winds. If no natural shelter were available some quick-growing trees should be planted such as pines, which would achieve the twofold purpose of providing shelter as well as timber for boxmaking, available in say 35 years from planting. The trees should be planted so as to be square all ways so that they could be cultivated by horse power, and thus save labor in keeping in condition. The holes should be 3ft. square and 18in. deep. In planting the young trees the roots should be spread out evenly, and there should be a small elevation in the middle of the hole, raising the tree slightly and giving the roots a downward tendency. The ground around the young trees should be trampled in fairly firmly, and the trees should be staked to prevent young roots from loosening by swaying about. If planting apples the trees should be obtained from a reliable nurseryman, and planted on blight-proof roots double worked. If planting pears they should be worked on seedling stocks, because they made better trees, and were not so subject to throw suckers. The seeds of Winter Nelis were best. If cherries were set the seeds of Mazzard were best. The following varieties of apples were suitable for home consumption:—Cooking—Mot's Royal, Empress (early), Dunn's Seedling and Stone Pippin (late); early eating—Irish Peach (very good, only subject to *fusicladium*), Williams Favorite, Gladstone, and Gravenstein (all for home use), following on with Cleopatra, Jonathan, Rome Beauty, Sturmers, and Worcester Pearmain (all suitable for export). As regards harvesting the crops, a fairly safe method was to cut the fruit, and if the pips were dark in color, approaching black, it was safe to pick them. Some fruits were better flavored if picked on the green side and then allowed to ripen on shelves, as for instance, the Duchess pears. Apricots and peaches should be picked on the firm side in order that they might be carried without crushing. A judicious thinning of fruit would give a better marketable article and quite as many cases. For success it was necessary to cultivate well, spray frequently, and manure judiciously.

#### MUNDALLA.

February 14th.—Present: seven members.

REAPING A CROP.—As soon as a crop of wheat was fit to harvest, remarked Mr. J. H. Windebank in a paper on reaping a crop, the machines should commence to reap it at once, because a crop harvested as soon as it was ready was far more easily handled and entailed far less waste than if allowed to become over ripe. That was particularly the case with oats and barley. In fact, oats could be stripped a little on the green side, as long as the bags were not sewn up for a day or two. The paddock should be always reaped the longest way, and the drilling should not be crossed more than was absolutely necessary, because the ground set so hard that considerable grain was lost off the comb, besides being very rough on the machine. The bags should be sewn up as soon as filled, and carted straight away, because wheat if left out in the sun for a few days would lose in weight from 6lbs. to 8lbs. per bag. A crop might be harvested with a reaper and thrasher, reaper and winnower, binder and thrasher, or a complete harvester. He preferred the complete harvester because it saved labor and wheat.



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*Minister of Agriculture.*